Botanical Diversity

Exploration, Understanding and Use

International Symposium

102. — Cacaoyer (*Theob*
t de branche portant des

Meise, Belgium
16–18 September
2010

Programme & Abstracts

Reading Room

A. Bogaerts, E. Robbrecht & J. Rammeloo
(editors)

Botanical diversity: exploration, understanding and use

Programme
&
Abstracts

16–18 September 2010
National Botanic Garden of Belgium
Meise (Belgium)

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Botanical diversity: exploration, understanding and use
Programme & Abstracts

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Contents

Preface	5
Programme	7
Abstracts	17
Index to authors	103
National Botanic Garden of Belgium	105
Royal Academy for Overseas Sciences	107

Botanical diversity: exploration, understanding and use

102. — Cacaoyer (*Thec*
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Preface

The United Nations have declared 2010 to be the Biodiversity Year. The Royal Academy for Overseas Sciences and the National Botanic Garden of Belgium join the numerous initiatives in organizing a three days symposium. All groups of plants – green plants, fungi, selected groups of protists – will be covered. Themes are (1) history of exploration, (2) study of richness, evolution and conservation, and (3) traditional and modern uses. Geographical emphasis is tropical.

This symposium covers a wide range of topics and shows the multidisciplinary nature of research in the field of biodiversity. The first theme (History of exploration) is about history and humanities. The second (Study of richness, evolution and conservation) refers to the biological sciences and more specifically to phylogeny and systematics of plants in the wide sense. The third component (Traditional and modern uses) concerns the more practical aspects and economic botany.

The aim is to stimulate a wide interest to the topic in the Biodiversity Year, to highlight the contribution of Belgian scientists to overseas biodiversity research and to demonstrate the importance of biodiversity conservation.

PROGRAMME

Thursday, September 16, 2010

National Botanic Garden of Belgium

12.00 **Registration**

13.00 **Official opening**
by Prof. Jan Rammeloo, Director of the National Botanic Garden of Belgium & Prof. Danielle Swinne, Permanent Secretary of the Royal Academy for Overseas Sciences

THEME 1 – HISTORY OF EXPLORATION

13.20 - 13.50 **Accounts of tropical nature in scientific expeditions (18th and 19th centuries)**
Dr. Lorelai Kury (Fundação Oswaldo Cruz – Brazil)

13.50 -14.20 **State-funded journeys of exploration and botanical knowledge in the Age of Versailles**
Dr. Jan Vandersmissen (Université de Liège – Belgium)

14.20 - 14.40 **Flanders discovers the Latin American botany: plant hunters, greenhouses and commercialized cultivation around Ghent (1815-1870)**
Dr. John Everaert (Ghent University – Belgium)

14.40 - 15.00 **Everard im Thurn in British Guiana: collecting tropical nature**
Dr. Sara Albuquerque (Royal Botanic Garden Kew – UK)

15.00 - 16.00 **COFFEE BREAK & POSTER SESSION**

16.00 - 16.30 **Early Belgian plant collecting policy (1830-1865): Why? Where? Who benefited from it?**
Dr. Denis Diagre (National Botanic Garden of Belgium)

16.30 - 17.00 **Recent Belgian plant hunting for new goals**
Dr. Marie-Stéphanie Samain (Ghent University – Belgium)

17.00 - 17.30 **Boyekoli Ebale Congo 2010: the 21 century Congo River biodiversity expedition**
Dr. Christine Cocquyt (National Botanic Garden of Belgium)

Friday, September 17, 2010

THEME 2 – STUDY OF RICHNESS, EVOLUTION AND CONSERVATION

9.15 - 9.45 **If conservation is a responsibility for all, why are taxonomists going extinct? Or are they? Perspectives from South Africa**
Dr. Gideon Smith (South African National Biodiversity Inst., Univ. Pretoria – South Africa)

09.45 - 10.15 **Fungal Biodiversity: hiding in plain sight**
Dr. Pedro Crous (Centraal Bureau voor Schimmelcultures, Utrecht – The Netherlands)

10.15 - 10.45 **Conflicting interests in the conservation of fungi and plants**
Dr. Bart Buyck (National Museum of Natural History – France)

10.45 - 11.10 **COFFEE BREAK**

11.10 - 11.40 **The essential role of botanical exploration and natural history collections for informing conservation of tropical plants**
Dr. Porter P. Lowry (Africa and Madagascar Dept., Missouri Botanical Garden – USA)

11.40 - 12.00 **Using relative floristic resemblance to evaluate the value and placement of protected areas**
Dr. Jan Wieringa (Netherlands Centre for Biodiversity Naturalis – The Netherlands)

12.00 - 12.20 **Can models based on inventory, climate and satellite-derived data predict tree alpha diversity of African rain forests?**
Dr. Ingrid Parmentier (Université Libre de Bruxelles – Belgium)

12.20 - 12.50 **Have phylogenetic studies contributed to a better understanding of the African flora?**
Dr. Benny Bytebier (Bews Herbarium, University of KwaZulu-Natal – South Africa)

12.50 - 14.00 **LUNCH**

14.00 - 14.30 **New insights on species delimitation and species history using phylogeographic approaches and DNA barcodes in Central African plants**
Dr. Olivier Hardy (Université Libre de Bruxelles – Belgium)

14.30 - 14.50 **Conservation status of *Hydrangea seemannii* (Hydrangeaceae) in Mexico: an interference based on ecological niche modelling**
Dr. Carolina Granados-Mendosa (Ghent University – Belgium)

14.50 - 15.20 **On the recent origin and assembly of the African savanna biome – evidence from dated phylogenies**
Dr. Muthama Muasya (Department of Botany, University of Cape Town – South Africa)

15.20 - 16.00 **COFFEE BREAK**

16.00 - 16.30 **The algal diversity of lakes Nakuru and Elmenteita (Kenya, East Africa)**
Dr. Balthazar Mpawenayo (Burundi University)

16.30 - 17.00 **Phytoplankton diversity analysis in a floodplain wetland along a ten-year period: different scales and approaches**
Dr. Inés O'Farrell (Department of Ecology, Genetics and Evolution, University of Buenos Aires – Argentina)

17.00 - 17.20 **Thirteen years of experience with the Central Africa orchid shadehouse network: main results and perspectives**
Dr. Tariq Stévart (Missouri Botanical Garden – USA)

17.20 - 17.50 **Etude de l'impact de la déforestation sur la biodiversité végétale par imagerie satellitaire au Nord-Est de la République Démocratique du Congo**
Dr. Jean-Baptiste Dhetchuvi
(Institut Supérieure Pédagogique – R.D.Congo)

Saturday, September 18, 2010

THEME 3 – TRADITIONAL AND MODERN USES

9.30 - 10.00 **The William L. Brown Center at Missouri Botanical Garden: two decades of global ethnobotanical research and sustainable resource development**
Dr. Rainer Bussmann (William L. Brown Center, Missouri Botanical Garden – USA)

10.00 - 10.30 **How far local use of target plant species challenge their conservation in land use area in Africa**
Dr. Brice Sinsin (Faculté des Sciences agronomiques, Université d'Abomey-Calavi – Benin)

10.30 - 10.50 **Wild edible plant knowledge by the Turumbu, Mbole and Bali ethnic groups, District Tshopo, Oriental Province, D.R. Congo**
Dr. Céline Termote (Ghent University – Belgium)

10.50 - 11.10 **COFFEE BREAK**

11.10 - 11.40 **La place des produits forestiers non ligneux dans l'aménagement durable de la Réserve de biosphère de Luki en République Démocratique du Congo**
Dr. Shango Mutambwe (Ecole Régionale Post-Universitaire d'Aménagement et Gestion Intégrés des Forêts et Territoires Tropicaux, University of Kinshasa – R.D. Congo)

11.40 - 12.10	**Uses of indigenous woody plants and their potential for conservation in Burundi and Rwanda** Dr. Elias Bizuru (Department of Biology, National University of Rwanda – Rwanda)
12.10 - 12.30	**Conventional and modern approaches for using genetic diversity in crop improvement: the case of cassava (*Manihot esculenta*) in sub-Saharan Africa** Dr. Ivan Ingelbrecht (Ghent University – Belgium)
12.30 - 13.00	**Nature as an ingenious engineer and designer and the necessitate importance to save the biodiversity on earth** Dr. Bob Ursem (Delft University of Technology – The Netherlands)
13.00	**RECEPTION & POSTER SESSION**

ABSTRACTS

The abstracts are arranged in alphabetic order according to the first author's last name. The order is independent of whether the presentation is oral or a poster, which is indicated on the side. The presenting author is bold-faced and his/her e-mail is printed below the authors list.

Oral

Everard Im Thurn in British Guiana: collecting tropical nature

Sara Albuquerque
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This paper forms part of the research project Cross-cultural Histories of Tropical Botany in Latin America, supported by an AHRC Collaborative Doctoral Award between Birkbeck, University of London and the Royal Botanic Gardens, Kew. I will focus on the tropical collections from British Guiana (now Guyana) amassed by Everard Im Thurn (1852-1932) during his travels to the region from 1877 to 1882. Im Thurn was a Museum Curator, Botanist, Explorer, Anthropologist, Photographer, and Administrator. He thus contributed not only to the Botany field, with collections of botanical specimens and published papers, but also to Anthropology with many published works, which highlight his interest in photography. Besides Kew Gardens, Im Thurn's collections of natural history objects are also held by the British Museum, Pitt Rivers Museum (Oxford), National Museum of Scotland (NMS) and herbarium at the Natural History Museum, London.

Through a critical engagement with Im Thurn's documents and materials identified in these herbaria, economic botany collections, archives and libraries of these various British institutions, my aim is to explore the role of cross-cultural exchanges in the development of tropical botany. The trajectories of the natural history objects collected by Im Thurn were subjected to different regimes of viewing and understanding within colonial, national, local and personal histories. Fragments and glimpses of these stories may be found across the making of the herbaria, the manuscript accounts (letters, diaries and field-books), the writing and illustrating of books, in the material culture of economic botany, and the taking of photographs. By conducting in-depth research in these repositories, I seek to unearth histories of ethno-botany and economic botany in Latin America. In the process, I will reflect on the methodological challenges posed by the idea of researching through and integrating different kinds of materials held by the different repositories: the library, manuscript archives, herbarium, and economic botany collections.

Poster

Towards management of genetic diversity in a threatened traditional agro-resource: Ylang-Ylang (*Cananga odorata* forma *genuina*) in Indian Ocean islands

Céline Benini, Grégory Mahy, Marie-Laure Fauconnier, Patrick du Jardin & Jean-Philippe Bizoux
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The aim of this study was to assess the level of morphological and genetic variation (genetic diversity and structure) within and between poorly managed plantations of Ylang-Ylang, an economically important and threatened species across different islands in Indian Ocean to generate strategies of conservation management practises. In order to establish that foundational basis, we will investigate the Ylang-Ylang diversity by combining both morphological and molecular approaches.

For the morphological study, we used six morphometric traits (first and second series petal length and width and leaves length and width) to collect data. For molecular study, we performed AFLP (Amplified Fragment Length Polymorphism) analysis on the same 225 individuals sampled in Grande Comore, Madagascar and Mayotte for the morphological analysis. Data analyses were performed in order to investigate morphological differences between individuals, plantations and islands, to determine the Nei's genetic diversity and the structure (Analysis of Molecular Variance, differentiation index (F_{st}) and Bayesian analysis) of individuals and finally, to test for the relatedness between morphological and genetic distances.

AFLP analysis revealed a substantial level of genetic diversity for an introduced species (Ht = 0.2599). Each individual studied produced a unique AFLP banding pattern. Hierarchical AMOVA showed that the greatest part of the total variation was due to intra-population variation (67.58%). But 20.68 % were assigned to variation among population. F_{st} among populations from Grande Comore island was the highest (F_{st} 0.4680) and the lowest for Madagascar (F_{st}=0.1894). F_{st} value in Mayotte is 0.3379. The Bayesian analysis indicated the presence of five distinct genetic clusters in the sample of *Cananga odorata* (Lam.) Hook & Thoms. There was only one specific gene pool in Madagascar. There were two gene pools in Mayotte one of which was shared with Madagascar. Grande Comore had three specific gene pools. Three factors ANOVA revealed that there were significant morphological differences between islands, plantations and individuals for all foliar variables. Analysis of variance revealed that there were significant morphological differences between islands, plantations of an island and individuals of a plantation

for all foliar variables. Analysis of variance one molecular and morphometric data combined revealed significant morphological differences between the five gene pools indentified by structure for all foliar and floral variables studied.
In this study, the impact of both the influence of present day low management practices and past history introductions and spread processes on genetic variation and population structure is discussed. Conservation strategies are proposed.

Poster

Usages traditionnel: plantes comestibles sauvages du Burundi

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Université du Burundi, Faculté des Sciences, Département de Biologie, BP 2700, Bujumbura, Burundi

La situation géographique du Burundi ainsi que la diversité des conditions écologiques lui confèrent une grande richesse des écosystèmes naturels et des espèces végétales sur son étendue pourtant modeste.

Ces écosystèmes fournissent des ressources biologiques très variées que l'homme utilise pour satisfaire ses besoins divers dont ceux liés à son alimentation. La population riveraine des milieux naturels a acquis une connaissance exceptionnelle en ce qui concerne les plantes alimentaires. A part les produits végétaux exotiques résultant de l'agriculture, les produits indigènes sauvages jouent un rôle prépondérant dans l'alimentation de la population.

Les enquêtes menées sur terrain et les recherches bibliographiques nous ont permis de dresser une liste d'une centaine d'espèces végétales sauvages, y compris les champignons, consommées au Burundi sous forme de légumes, de fruits, de tubercules, d'épices et de boissons.

Ces espèces poussent spontanément dans les milieux écologiques variés: forêt de montagne, forêts claires, galeries forestière, savanes, milieux humides et bosquets xérophiles. Elles sont récoltées à l'état sauvage, seules quelques espèces ont été domestiquées.

Malheureusement, face à la dégradation des écosystèmes, certaines de ces espèces comestibles sauvages, comme d'autres espèces en général, ont disparu ou sont en voie de l'être et sont par conséquent mal connues par certaines catégories de la population actuellement.

La connaissance et la mise en évidence l'intérêt de ces espèces comestibles sauvages permettront leur domestication et leur mise en valeur contribuera à la sauvegarde de l'environnement.

Poster

Flora and plant communities of the city of Bujumbura (Burundi): diversity, origin and conservation value

Joseph Bigirimana[1,2,*,**], Jan Bogaert[3], Charles De Canniere[1], Marie-José Bigendako[3], Jean Lejoly[1,*] & Ingrid Parmentier[1,**]
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*Research Group on Landscape Ecology and Plant Production Systems, CP 169
**Evolutionary Biology & Ecology, CP 160/12

The spontaneous vegetation of the city of Bujumbura has been studied through the analysis of 437 vegetation plots. Four major plant communities were identified. Ruderal plant communities dominate in the most urbanized areas while in the outskirts of the city, the vegetation shows similarities to natural plant communities in the region. The variability of the plant communities is further influenced by the degree of shade, the presence of a permanent source of humidity and the level of trampling by humans and animals. Among the 404 species recorded in the plots, 57% are native and 43% are introduced. Sixty percent of the 173 introduced species originate from tropical America. Seventy four percent of these species are invasive. Four of these invasive species form large (> 1 ha), almost monospecific stands indicating the presence of degraded soils: *Tithonia diversifolia* (Asteraceae), *Mimosa invisa* (Fabaceae), *Lantana camara* (Verbenaceae) and *Imperata cylindrica* (Poaceae). All plant communities have an interest for biodiversity conservation and or provide services to the population. It is very likely that in the future, the urbanization process will lead to the homogenization of the vegetation in favour of ruderal plant communities and introduced species.

Poster

Analyse de la chaîne de valeur de *Gnetum africanum* auprès des vendeurs des marchés Gambela et Pascal à Kinshasa (R.D.Congo)

Apollinaire Biloso Moyene[1], John Mafolo, Ann Degrande & Zac Tchoundjeu
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Identifier les vendeurs de *Gnetum africanum* opérant aux marchés Gambela et Pascal à Kinshasa et les répartir en fonction de leur profil social (genre, niveau d'étude, statut matrimonial, composition de ménage, profession, ancienneté dans la pratique de vente, etc.) pour connaître les majoritaires, déterminer les contraintes liées à cette activité commerciale, mettre au point quelques stratégies opérationnelles telles que la vulgarisation des techniques de transformation post récolte afin de pérenniser l'activité, estimer la rentabilité commerciale de vente et son affectation socio-économique par les vendeurs de *Gnetum africanum* des marchés Gambela et Pascal à Kinshasa sont les objectifs assignés à notre investigation. Le commerce de *Gnetum africanum* est pratiqué par les femmes pour 7 cas sur 10, ayant franchi les études secondaires, dont l'âge varie entre 20 à 50 ans, marié pour la plupart d'entre elles. L'éloignement de lieux de production, manque d'infrastructures de vente et de stockage constituent les principales contraintes. La commercialisation du *Gnetum africanum* est l'unique source de revenu (9 vendeurs sur 10) pour satisfaire aux besoins sociaux de base. La rentabilité commerciale dans la vente de *Gnetum africanum* est éstimée à 74% chez les grossistes et 86% chez les détaillants du marché de Pascal; tandis qu'elle est respectivement de 94% et 159% pour ceux de Gambela. L'alimentation, la santé, l'éducation des enfants et le loyer sont les principaux postes d'affectation de revenu générés par la vente de *Gnetum africanum*.

Oral

Uses of indigenous woody plants and their potential for conservation in Burundi and Rwanda

Elias Bizuru

National University of Rwanda, Department of Biology, Rwanda

Burundi and Rwanda are part of the most biologically rich African region, the Albertine Rift ecological region. This stretches from the northern tip of Lake Albert to the southern tip of Lake Tanganyika and contains the natural habitat of about 100 km along the border with the Democratic Republic of Congo. The Albertine Rift region is basically the center of Afro-montane endemism from the phytogeographical classification of White (1983). The region has more than 3000 endemic species. Nowadays some plant species have extinct in the Rwandan and Burundian territories; others are disappearing unless something is done to safeguard that indigenous flora. Actually, most of the Burundian and Rwandan landscapes outside protected areas are covered by exotic plantations of *Eucalyptus* with the consequence of degradation of the local flora.

This study was undertaken in order to find alternatives to exotic tree plantations in recover the true value of local woody species for local communities. The work consisted to identify those local species sought the most by local people for their various traditional and current uses and explore the possibilities of their domestication and propagation. Many woody species are used for the production of good quality timber. More than 100 woody plant species have medicinal uses in Rwanda and few species are edible. Other uses are the manufacturing of art objects, household materials (crafts), the charcoal making and various constructions. Throughout the territory of Burundi and Rwanda, 70.8% of all species are considered by local people as rare or absent outside protected areas. From the findings of this study, it appears that most species for conservation are mountain. Despite this diversity, in mountainous areas there is a great weakness vis-à-vis the sustainable conservation of forest resources which are of great value for both rural and urban populations. In view of the alarming situation of hazards on woody species of Rwanda and Burundi, there is still a way to save some of them based already on the success stories of domestication in neighboring countries. For most mountain forest species not yet domesticated, studies on germination showed a positive response.

Poster

Caractérisation des forêts à *Pericopsis elata* (Fabaceae) dans la réserve forestière de Yoko à Kisangani, R.D.Congo

Faustin Boyemba[1], Sylvie Gaudot-Fleury, Marcelin Vasser, Robert Nasi, Jean Lundy, Moyeu Maiy & Charles Kasongo
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L'étude de la caractérisation du peuplement forestier dans lequel se développe *Pericopsis elata* (Harms) Van Meeuwen, concerne une parcelle permanente de 250 ha installée dans la réserve forestière de Yoko à Kisangani en République Démocratique du Congo. Dans cette parcelle, les individus de *P. elata* ≥ 10 cm de diamètre ont été cartographiés. Trois zones ont été identifiées en fonction de leur densité en pieds de *P. elata*: densité nulle pour la zone 1, densité faible (1 à 2 pieds/ha de *P. elata*) pour la zone 2, densité élevée (5 pieds ou plus) pour la zone 3. Dans chaque zone, des inventaires de tous les arbres ≥ 10 cm de diamètre, toutes espèces, ont été réalisés sur 20 placettes circulaires de rayon 20 m, soit un total inventorié de 2,5 ha/zone. La caractérisation des forêts de ces zones, concerne la structure des forêts (densité, surface terrière et structure diamétrique), la composition floristique (richesse, diversité et similarité floristique) et les tempéraments des espèces indicatrices. Il s'agit d'une comparaison directe de ces paramètres structuraux et floristiques entre les forêts sans *P. elata* et les forêts avec *P. elata*. Il apparaît, aux termes de ce travail, que *P. elata* aurait profité des perturbations (trouées ou chablis) pour s'installer, le peuplement forestier dans lequel elle se développe est caractérisé par des espèces des stades relativement jeunes (espèces pionnières) de la succession secondaire, parmi lesquelles *Petersianthus macrocarpus* occupe la première position du groupe (IV = 89,6 %).

Mots clés: *Pericopsis elata*, forêts, réserve forestière de Yoko, R.D.Congo.

Oral

The William L. Brown Center at Missouri Botanical Garden: two decades of global ethnobotanical research and sustainable resource development

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The William L. Brown Center (WLBC) is Missouri Botanical Garden's research unit specializing on plant use. Currently operating in over a dozen countries, in the Gardens target regions (Mesoamerica, Tropical Andes, Eastern Africa and Madagascar, Indo-China) WLBC is one of the largest programs on Ethnobotany in the world. Projects conducted by the WLBC include significant training programs ranging from botanical field techniques and ethnobotanical research to collections management, market development, sustainable production and public health.
The WLBC program brings together a unique team of in-country and American students and researchers, traditional healers, western doctors, market venders, plant collectors and community members. The program attempts to document the use of traditional medicinal plants and the often complex plant mixtures prepared by local healers. In addition, it establishes the local infrastructure to conduct bio-assays aiming to verify the efficacy of local preparations and evaluate possible toxicity to allow a safer use of traditional medicine in public health programs. Local communities are encouraged to establish their own ethnobotanical gardens through the through the WLBC Sacred Seeds program, and to produce Spanish plant use guides with sound taxonomic information, in order to preserve these important plant resources an the traditional knowledge attached for the future.

Oral

Conflicting interests in the conservation of fungi and plants

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In the past, biodiversity has usually been declined along two axes: zoological and botanical. Fungal biodiversity was frequently ignored when considering conservation value of forests and other vegetation types. This presentation wants to stress the exceptional biodiversity of fungi in several types of vegetation that are usually considered of low conservation value from a botanical point of view. As a result, most of these ecosystems are usually not on the priority list for conservation. With examples taken from some of the dominant vegetation types in tropical Africa and Madagascar, the author will illustrate ecosystems that exhibit a very low botanical diversity but support an extremely high fungal diversity. The fact that this fungal component is even essential to the survival and maintenance of these habitats is usually ignored by conservationists and botanists. The author would therefore argue for a stronger accent on ecological strategies in the conservation of the world's biodiversity.

Oral

Have phylogenetic studies contributed to a better understanding of the African flora?

Benny Bytebier
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Over the last quarter of a century molecular phylogenetic analysis has substantially changed our understanding of patterns and relationships within the plant kingdom. As more and more phylogenies became available, emphasis shifted from a purely biosystematic and taxonomic interpretation to the use of phylogenies to investigate biogeography, timing of diversification, character evolution and (palaeo)ecology to name just a few.

I will use my own research on the large African orchid genus *Disa* to show how phylogenetic studies can contibute to a better understanding of the African flora. I will elaborate on the historical biogeography and show how *Disa* migrated unidirectional from the Cape into the Drakensberg and from there northwards into tropical Africa. I will also investigate the evolutionary history of the genus and, in the absence of fossil evidence and reliable climatic reconstructions, ask the question as to what an ecological reconstruction can tell us about past climates. I will show that the winter rainfall and fire regime, as well as the fynbos vegetation of the Cape of southern Africa are several million years older than currently suggested. This confirms the potential of using molecular phylogenies to date events for which other information is lacking or inconclusive.

Poster

Etude pilote sur les plantes envahissantes à São Tomé et Príncipe (projet EuropeAid, 2011-2015), une problématique nouvelle pour le Golfe de Guinée

Valérie Cawoy[1], **Tariq Stévart**[2, 3, 4] & Anne-Laure Jacquemart
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São Tomé et Príncipe est un petit archipel montagnard situé dans le Golfe de Guinée (Afrique centrale). Environ un tiers du territoire est classé en aire protégée: les Parcs Naturels de l'Obô de São Tomé et de Príncipe. Ces deux parcs constituent l'une des principales attractions touristiques de l'archipel, tout en protégeant la majorité des écosystèmes les plus riches en espèces endémiques. Bien que la vulnérabilité des écosystèmes insulaires soit mondialement connue, la conscience de la perte de biodiversité encourue en raison de la présence de plantes envahissantes est relativement récente. A São Tomé des résultats préliminaires indiquent qu'un grand nombre d'écosystèmes montagnards, que l'on croyait intacts et protégés, sont déjà fortement dégradés par la présence de plantes identifiées comme envahissantes dans la littérature (*Tithonia diversifolia*, *Cinchona* spp., *Rubus rosifolius*).
L'objectif de ce projet scientifique et de coopération financé par l'Union Européenne est de contribuer à la conservation des écosystèmes insulaires en contrôlant la perte de biodiversité liée à la présence de plantes envahissantes. Notre action vise à fournir: (1) la liste des plantes envahissantes de l'archipel, (2) des informations sur leur degré d'envahissement, leur dynamique d'expansion et leurs impacts, et (3) apportera les moyens efficaces, locaux et les moins coûteux possible pour les contenir, si ce n'est les éradiquer et réhabiliter les sites envahis. Ces informations seront diffusées localement auprès des communautés villageoises, des touristes (un important vecteur de dissémination) et des autorités de tutelle des deux parcs. Par ailleurs, les résultats seront diffusés au niveau international via le web, des communications et des publications. En effet, l'expérience acquise sera valorisable dans d'autre pays d'Afrique centrale car pratiquement aucune information n'est actuellement disponible sur cette thématique dans cette région du monde.

Oral

Boyekoli Ebale Congo 2010: the 21 century Congo River biodiversity expedition

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The Congo River expedition is an initiative of the three Belgian federal institutions studying living organisms: the Royal Museum for Central Africa, the Royal Belgian Institute of Natural Sciences and the National Botanic Garden of Belgium, and the University of Kisangani (R.D.Congo). After years of preparative work and the possibility to organize the expedition in 2010, it seems to be an excellent year: the year of biodiversity and the year of the 50th anniversary of the independence of Congo. Financial support was given by the Belgian Development Cooperation, the Belgian Science Policy and the National Lottery. Dr. Erik Verheyen (Royal Belgian Institute of Natural Sciences) and Prof. Dr. Dudu Akaibe (University of Kisangani) were the driving forces of this multidisciplinary expedition. The present lecture will focus on the botanic part of the expedition. Botanic is used in its broader sense, thus not only Spermatophyta but also including Myxomycetes, Fungi, Algae and Lichens. The botanic group was composed of 5 Congolese scientists (4 from the University of Kisangani and 1 from the Herbarium of Yangambi) and 9 European scientists (4 during the first part of the expedition, and 6 during the second part) of whom 6 are associated with the National Botanic Garden of Belgium. During the 38 days of the expedition, four camping sites between Kisangani and Bumba were used as base for daily excursions: Yaekela on the Congo River, Kona on the Itimbiri, Bomaneh on the Aruwimi and Lieki on the Lomami. A total of 1222 spermatophytes and ferns were collected in several duplicates: at least one for the herbarium of the National Botanic Garden in Meise, one for the herbarium of Yangambi and one for the biodiversity at the University of Kisangani. Moreover material for DNA analyses was sampled of each collected taxon and stored in silica-gel. All collected taxa were photographed in detail, with special attention to the flowers, fruits and seeds. Although the determination of all these species is still going on, a diversity of 600 species can be expected. To discover new taxa is not so obvious. Certainly some interesting and rare taxa are among the collected specimens.

About 750 specimens of lichens and 140 specimens of Myxomycetes were collected. To study the diatom diversity, water and benthic samples were taken in the rivers and small water bodies in the tropical rain forest as well as parts of submerged and floating plants. A total of 380 samples were collected.

Although most the material from the Congo River 2010 expedition must still be

analysed, we are already persuaded of the success of the expedition. Besides new taxa, surely in the group of lichens and diatoms, most of the discovered species will be new for the studied region as it was the first time that sampling took place in the area.

More information on the expedition can be found on:
http://www.congo2010.be/nl/expeditie

Poster

Boyekoli Ebale Congo 2010: material to study the diatom biodiversity along the Congo River and some of its tributaries between Kisangani and Bumba

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Algae diversity, and more specific diatom diversity, is not well studied in D.R.Congo. Publications on this group of organisms are restricted; we can cite among others several papers on the algae in the National Parc Albert (1949), publications of Duvigneaud & Symoens (1949), Kufferath (1956a, 1956b, 1956c) and Cholnoky (1970). None of those are dealing with the region covered by the Congo River 2010 expedition; only Golama Swana Kaketa A (1992, 1996) published on algae in the vicinity of Kisangani.

During the 2010 expedition about 380 samples for diatom analyses were collected from as many different habitats as possible. Not only the Congo river itself and some of its major tributaries such as the Itimbiri, Lomami and Aruwimi rivers were sampled, but also some small acid rivers (black waters in contrast to the brown waters of the larger rivers) and water bodies located in the tropical rain forest. Besides phytoplankton and phytobenthos, parts of submerged and floating plants, such as *Vossia cuspidata*, *Eichhornia crassipes*, *Commelina* sp., *Salvinia* sp., *Azolla pinnata*, *Ceratophyllum* sp., were collected to analyse the epiphytic diatom community. Our interest will go, not only to the species diversity, but also to spatial differences in the diatom communities and to the ecological preferences of the taxa. Examination of material collected by Pierre-Denis Plisnier (RMCA) and Damien Ertz (NBGB) during the pre-expedition in 2009 revealed some interesting diatom taxa. We are convinced that a number of taxa new to science will result from the light and scanning electron microscopic analysis of the material collected during the expedition. The ecological preferences, as determined by the measurements in situ and in collaboration with other participants of the expeditions, can hopefully lead to a future attempt to study the water quality in the region.

Poster

Tackling Data Deficiency in the Sampled Red List Index (SRLI) project

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The International Union for Conservation of Nature (IUCN) Sampled Red List Index (SRLI) for Plants project at Royal Botanic Gardens Kew has already completed conservation status assessments for African species.
Assessments are generally based on a preliminary geographic information system (GIS) range analysis under Criterion B, but Data Deficient (DD) species with < 3 specimens are a large and problematic proportion of the SRLI sample (> 30%). However, each species has at least the type specimen, and herbarium specimens provide important locality notes so that even without current information on population trends and dynamics, locality information can be used as the starting point for planning field surveys. A high proportion of DD species in areas with a high proportion of threatened species turn out to also be threatened after fieldwork and additional research. This poster presents a detailed analysis, incorporating further research and full IUCN assessments for species which are Data Deficient under their Extent of Occurrence (EOO), of preliminary-DD species as a proportion of all threatened species and of total diversity within individual areas and ecosystems in Africa, as a means of deciding which areas require greater monitoring and conservation effort, and which should be given priority in current research. Detailed population surveys of these species will ensure that SRLI data are used at the present time for local biodiversity monitoring, as well as analysing changes in the conservation status of individual species. Results from this approach might also reveal critical regions for further research in other taxonomic groups where the proportion of Data Deficient species is high.

Oral

Fungal Biodiversity: hiding in plain sight

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We are currently celebrating the International Year of Biodiversity as designated by the United Nations. As community we were invited to safeguard the variety of life on earth: biodiversity. Recent results from large scale DNA sequencing projects have shown that most biodiversity on earth is actually very small, represented in insects and microbes. Fungi represent a relatively unexplored group of organisms of which only the most common examples are known at species level. A conservative estimate based on the number of unique fungi per plant species suggest that at least 1.5 M species of fungi should occur on plants, of which around 7 % have been described to date. Many habitats, ecosystems and host plants have, however, never been investigated, and thus their microbial inhabitants remain unexplored, unknown, and underutilised. Over the past 10 years, mycologists have on average described 1250 species per year, meaning that it will take 1120 years to simply describe the number of taxa we now consider to be a vast underestimate. Furthermore, based on DNA data, the majority of fungal morphogenera are shown to be poly- or paraphyletic, and most morphological species appear to represent assemblages of different phylogenetic taxa, many of which turn out to be geographically separated. Although the Linnaean system was based on the phenotype, I argue that inconspicuous differences may in some cases be more relevant for trade and quarantine, and hence a more accurate naming system based on DNA data is called for. This is an achievable goal if scientists embrace the virtual laboratory of the future, and deposit related data in interactive, linked databases such as GenBank, TreeBase and BOLD, with metadata in MycoBank, and links to other user communities such as GBIF and EOL. This process, which could also be circumscribed as accountability in science, should be strongly enforced as part of the editorial policy of all reputable journals. Techniques to detect minute quantities of DNA, and compare partial or whole genomes are continually evolving. Although we need to improve our understanding of population dynamics and gene flow, we should also acknowledge the importance of new emerging diseases caused by novel organisms, or formerly less relevant pathogens that have gained new importance due to climate change. Molecular techniques, new sequencing platforms, and the accessibility of these data will play a central role in the future taxonomic system adapted for fungi.

Poster

How diverse are postulated refuge areas in Central Africa? A case study with the Monts de Cristal in Gabon

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The Monts de Cristal region (North-Western Gabon) is nowadays considered as one of the most important centres of plant diversity and endemism in Central Africa, and a postulated Pleistocene forest refuge. This status has been used by conservationists to justify the status of protected area for the region. However, three fundamental issues have not been addressed. (1) How much more diverse is the Monts de Cristal compared to other regions? (2) How is this diversity organized at different spatial scales (alpha and beta diversity)? (3) How can these spatial patterns of diversity be explained?
In the present study, the diversity of the tree community has been sampled by using transects of 0.1 ha (200 x 5 m) where all individuals with a diameter > 5 cm were recorded and identified. A total of 58 transects representing 6368 individuals have been sampled in the Monts de Cristal, the littoral region around Libreville and the Massif du Chaillu (Centre of Gabon). To address the first two questions, we used methods based on rarefaction principles and "effective number of species" in order to obtain unbiased and comparable estimates of diversity. The third question was addressed by exploring the role of environmental gradients explaining the spatial patterns of diversity both within and between the regions, searching for correlations between diversity and environmental parameters such as altitude, topography and rainfall. The effect of dispersal limitation on species turn-over was also investigated by studying pairwise similarity decay of samples with geographical distance.

Key words: local diversity, beta diversity, tree communities, Gabon, Monts de Cristal, Massif du Chaillu, environmental gradients.

Poster

Boyekoli Ebale Congo 2010: Myxomycetes in the vicinity of the Congo River between Kisangani and Bumba

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Myxomycetes or plasmodial slime molds are a fascinating group of bacterivorous, amoeboflagellate protists. Their life cycle comprises a motile holotrophic and coenocytic stage that changes into static fruiting bodies which contain spores. Myxomycetes can develop in all terrestrial ecosystems on decaying wood and plant litter. Some are cosmopolitan, while others are associated with specific habitats like bark of living trees or snowbanks in (sub)alpine regions. They are relatively well studied in the temperate zones of the northern hemisphere. During the last 30 years efforts have been put into surveys in the tropics. A recently published checklist of African myxomycetes based on literature (Ndiritu et al. 2009) reports only 9 species for the Democratic Republic of Congo, although a total of 21 species from D.R.Congo are treated in two volumes of the "Flore Illustrée des Champignons d'Afrique Centrale" (Buyck 1983, Rammeloo 1981 & 1983).
The herbarium of the National Botanic Garden of Belgium holds about 300 specimens representing 75 species collected mostly in the period 1980-1990 in D.R.Congo. The region visited during the Congo River 2010 expedition, located west and north-west of Kisangani, is an unexplored area. A total of 143 specimens were collected. Preliminary field-identifications show about 9 new records for D.R.Congo and at least one new record for Africa. According to the records of the National Botani Garden of Belgium, the closest region sampled is north-east to south of Kisangani (de Haan & Bogaerts 2009).

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Poster

Claustropileate boletes are monophyletic

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An in depth morphological study of all available claustropileate boletes from Africa has revealed two taxa, i.e. *Veloporphyrellus africanus* Watling and one new species in *Boletellus* with striate spores. The latter originates from Gabon and is very closely related to *Boletellus ananas* (M.A. Curtis) Murril. The bulk of the claustropileate material from Africa belongs to *Veloporphyrellus africanus*. Since its description *Veloporphyrellus africanus* was found in many tropical African countries, i.e. Bénin, Togo, Zambia, Burundi and Kenya. This species has marginal (velar) flaps embracing the stipe in exactly the same way as *Boletellus ananas* (M.A. Curtis) Murrill (1909), *Boletellus immutabilis* (Bouriquet) Perreau apud Heim & Perreau, *Boletellus emodensis* (Berk.) Singer, *Boletellus ananaeceps* (Berk.) Singer, *Boletellus dissiliens* (Corner) Pegler & T.W.K and *Boletellus coccineus* (Fr.) Singer, all in *Boletellus* sect. *Boletellus* (Singer 1986). Considering the wealth of morphological features (microscopy and macroscopy) these *Boletellus* have in common with *Veloporhyrellus africanus*, it is difficult not to place the latter in this genus. With the importance given to spore morphology of boletes, this placement seemed impossible without molecular evidence.
Based on morphological and molecular analysis of the type specimens (*Boletellus* and *Veloporphyrellus*) and our own records from Africa, we can now confirm that *Veloporphyrellus africanus* belongs in the clade of *Boletellus*, i.e. next to the type species *Boletellus ananas*.
Including a smooth-spored claustropileate bolete within *Boletellus* calls for redefining this genus. The necessity for a striate spore ornamentation is abandoned in favor of the claustropileate nature of the basidiomes. By this, the position of all apertopileate (with normal pileus margin) taxa within *Boletellus* becomes uncertain. All these taxa, i.e. in *Boletellus* Sect. *Chrysenteroidei*, are recognised by a xerocomoid habit and winged, costate or striate spores. Further molecular analysis will indicate whether they deserve a separate generic rank or accommodation within *Xerocomus* or *Xerocomellus*.

Key words: Basidiomycota, Boletineae, *Boletellus*, *Veloporphyrellus*, taxonomy, phylogenetics.

Poster

Boundary conflicts: *Epimedium* (Berberidaceae), species without boundaries?

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Despite several molecular and morphological studies, taxa within *Epimedium* remain poorly understood. One cause for this ambiguity is the presence in natural populations of individuals showing aberrant combinations of character states. As these specimens cannot be identified as one of the recognised taxa, species boundaries within *Epimedium* are obscured. Furthermore, previous studies showed low sequence divergence for several molecular markers, resulting in poorly supported phylogenies. The living *Epimedium* collection at the Botanical Garden of Ghent University includes several of these aberrant individuals. Using this collection we compared 133 specimens with descriptions of the 54 species recognised in the revision by Stearn (2002). With these comparisons, we aimed at resolving the affinities of aforementioned aberrant individuals, and evaluating the practical value of species descriptions. Furthermore, *matK* and ITS sequences where obtained for 50 species, and used to construct phylogenetic trees and haplotype networks. Therefore, genetic diversity in *Epimedium* could be explored and compared to morphological variability.

The present study confirmed an intermediate position between two or more recognised taxa for most of the aberrant individuals. Furthermore, low practical usability of the species descriptions in *Epimedium* was suggested. As in many taxa, standardised terminology and methodology for describing new species are absent, complicating comparison of observations to descriptions. Indeed, often only limited descriptions for potentially diagnostic characters where available, rendering comparison with observations uncertain, complicating identification of diagnostic characters. Nevertheless, the current study identified several characters with potential diagnostic value, which should be subjected to further study. For example, four clearly discernible types of pubescence for the abaxial leaflet-surface where recognised. These character states could be used to delimit relatively uniform groups in the dataset when combined with other characters. Type specimens should be investigated to corroborate the diagnostic value of such characters.

In the haplotype networks for both molecular makers, all specimens diverged by a limited amount of mutations. This incongruence between morphological and genetic diversity possibly represents an artefact. In this study however, we postulated that a recent origin of recognised taxa with hybridisation between poorly

differentiated entities, could also explain the observed patterns.
Further studies should explore this hypothesis by evaluating variation in multiple nuclear markers, in order to infer present and past gene flow between natural populations of *Epimedium*.

Oral

Etude de l'impact de la déforestation sur la biodiversité végétale par imagerie satellitaire au Nord-Est de la République Démocratique du Congo

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Depuis quelques décennies, la gestion inappropriée du secteur forestier, les crises politiques prolongées et l'accroissement de la population ainsi que sa paupérisation n'ont pas permis une conservation efficace des forêts et de la biodiversité au Nord-est de la République Démocratique du Congo. Au contraire des larges superficies de forêts ont été perdues durant ce premier cinquantenaire de la R.D.Congo par une déforestation incontrôlée.

Notre recherche s'effectue dans la partie nord-est de la forêt dense humide africaine. Notre objectif est de déterminer la perte du couvert forestier et ses conséquences sur la biodiversité végétale.

Pour y arriver nous avons utilisé les anciennes cartes topographiques et l'imagerie satellitaire en vue de générer une nouvelle carte de la végétation ainsi que la carte de l'utilisation du sol. Les observations sur le terrain ont permis de préciser les différents types de végétation.

Les résultats démontrent une diminution progressive de la superficie forestière qui entraîne la disparition de nombreuses espèces végétales. Les aires de distribution géographique de la plupart des espèces se trouvent modifiées. La fragmentation de la forêt se remarque par des lambeaux forestiers et des calottes de forêts isolées sur certaines crêtes des Monts Bleus longeant l'ouest du lac Albert. La limite Est de la forêt dense recule vers l'ouest.

Le commerce lucratif du bois à Bunia, Beni et Butembo, mais aussi l'exportation vers l'Ouganda, le Rwanda et le Kenya, voire les pays d'Asie sont entre autres causes d'abattages incontrôlés de la forêt; d'autre part, l'agriculture itinérante et sur brûlis contribue énormément à la perte de la biodiversité végétale; il s'agit d'une menace pour les essences précieuses comme *Entadrophragma* sp. et autres espèces.

Oral

Early Belgian plant collecting policy (1830-1865): Why? Where? Who benefited from it?

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Belgian plant collectors are best known for their work in the Congo during and after the colonial period (from 1885 on). Yet before Belgians became involved in Africa, there had already been a considerable plant collecting activity overseas. However this remains poorly known, particularly for the period between 1830 and 1865.

The fact is that Belgian plant collecting expeditions first originated from the passion of the bourgeoisie for exotic plants. This is why some of the first naturalists relied on private money to make an Atlantic crossing to Brazil and Mexico. Van Houtte, Linden, Funck, Ghiesbreght and Galeotti all depended, at least partly, on rich amateurs to pay for their hazardous foreign journeys. In the *société bourgeoise* of the early XIXth Century, in a still developing, newborn Belgium, supporting young orchid collectors was not a priority for the government. It is thus obvious that the leading classes sent young people to the America's only to fill their own greenhouses that were popping up all over Belgium. All in all, it was bourgeois tastes that first shaped the collecting policy. Only later did the Belgium state become involved, though not alone, since the fast-growing horticultural trade also paid the bills.

This first sketch will address the following questions: What were the favorite plants for the bourgeoisie? Why was the leading class so fond of exotic plants and "Nature"? Who were the naturalists? What did they collect and what future did they have in mind? Did the collectors bring new trends or fashions to horticulture? Had the Belgian State a real influence on the collecting policy or not? Did the then called "national science" benefit from the naturalists activities?

Poster

A new platform to document orchid diversity in central Africa – www.orchid-africa.net

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A new web-based platform documenting the orchid diversity of Central Africa is available at www.orchid-africa.net. This online database includes scientific names, distribution data, photos, multi-access identification keys, web links, and references. Informations presented on the platform result from intensive fieldworks carried out by the Université Libre de Bruxelles, the Université de Yaoundé I, the Missouri Botanical Garden and the Institut de Recherche pour le Développement in several countries of Central Africa. The database currently comprises information on 220 illustrated orchid species; many of them were pictured in our shadehouse network or in the field. The final goal of this easily up-dated platform is to document the emblematic orchid family and to promote land conservation and sound natural resource management in tropical Africa by enhancing the personal ownership of each citizen for Earth biodiversity. Its use for academic, educational, and general is thus highly encouraged.

Key words: Central Africa, identification key, online picture database, Orchidaceae, epiphyte, shadehouse.

Poster

CpDNA-based species identification and phylogeography: application to a complex of African tropical tree species

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Despite their importance as a hotspot of biodiversity, the history of the African tropical lowland rainforests is poorly known. In particular the respective influence of past climatic factors, environmental heterogeneity and physical barriers on the demographic history of plant species still have to be studied. Molecular approaches that characterise the distribution of genetic diversity in plant species and try to interpret it in the light of past historical events are promising in this respect. We examine here the distribution of genetic diversity at maternally-inherited markers (chloroplast DNA) of two tropical timber tree species, *Erythrophleum ivorense* and *Erythrophleum suaveolens* (Leguminosae-Caesalpinioideae), in their Lower Guinea distribution (essentially Gabon and Cameroon). As for many tropical sister-taxa, species identification is almost impossible in the field when flowers or fruits are not available. Using a blind-sampling approach and confronting molecular and morphological markers it was possible to attribute sampled individuals to one or the other species. The two species appear to have different ecological requirements and are rarely found in sympatry. A phylogeographic signal was found for *E.*

suaveolens and, for both species, higher levels of diversity were observed in the South than in the North of the Lower Guinea domain. A recent period of forest perturbation, potentially human-induced, has probably favoured the expansion of these two light-demanding species. An observed genetic signal of demographic decline and the poor recruitment of the species can be interpreted as consequences of the natural succession of the forest formations.

Poster

Species identification and estimation of inter-species gene flow: application to a set of sympatric tropical tree species from tropical Africa, the genus *Carapa* (Meliaceae)

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Morphological species identification in tropical ecosystems can be challenging in the absence of reliable or easily available morphological diagnostic characters. This particularly concerns sister tree species occurring in sympatry with potential inter-specific gene flow. In this context, population genetic approaches are relevant both for species identification and for the estimation of inter-species gene flow. Here, we test this approach on the model genus *Carapa* (Meliaceae) in South Cameroon. Sets of individuals were sampled in three populations where different *Carapa* species were found in sympatry. A general agreement between morphological and nuclear DNA markers (both microsatellites and ITS) in species delimitation allowed an assignation of the individuals to species. In particular, three nuclear gene pools were defined using microsatellites and each corresponded to a different species. However, despite a congruence of these data with chloroplastic DNA markers (cpDNA) the absence of cpDNA polymorphism in one of the three populations revealed historical gene flow between the two sympatric species. Overall this study demonstrates (i) the need to interpret cpDNA-based species identification with caution and the limitation this imposes on the use of cpDNA barcodes in this respect; (ii) the necessity to compare maternally-inherited and biparentally-inherited markers for inter-specific gene flow studies; (iii) the usefulness of developing population genetic approaches for species delimitation in sister species presenting potentialities of gene flow; (iv) the complexity of the evolutionary history of the genus *Carapa* in Africa.

Poster

History of the exploration of Libyan flora

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This study is focused on documenting the history of exploration of the Libyan flora, from the aspect of number of species, the important and most distributed families, in addition to endemic, rare and endangered species.

Libya is a vast country, with an area of almost 1,800,000 square kilometer, coordinates 18-33 north and 9-25 east. The coastal strip extends about 1900 km, with prevailing of Mediterranean climate, hot dry summers and warm wet winters, the average annual temperature is about 17-20 degrees Celsius, while rainfall ranging between 150-300 mm/year, but it is ranging between 300-600 mm/year in the areas of EL-Jabal EL-Akhadar (the Green mountain) north east and in the West mountains north west of the country. While the desert climate dominates over more than 95% of the country, with rainfall less than 100 mm/year, and average annual temperature ranging between 25-30 degree Celsius.

Topography, soil and climate, affects the distribution of the vegetation in the different areas, which is divided into four major groups: the coastal vegetation, the northern highlands vegetation, the desert vegetation and the southern mountains vegetation.

In fact, the history of the Libyan flora goes back to ancient ages, where the natural vegetation was the ethnobotanical resource of the local inhabitants, pastures for their grazing animals.

The first sources of information concerning the Libyan flora goes back to the pharaohs era, later many historians, botanist and travelers succeeded in collecting and describing many plant species. But the most important development of modern explorations of the Libyan flora took place in 1703 when Lemaire, during his expedition searching for the famous plant *Sylphium* which he called *Selfione*, made the first acknowledged scientific work. Followed by Lucus in 1707, and Della Cella in 1817. The researches and studies rolled through the nineteenth and twentieth centuries, and were intensified during the period of Italian colonialism; we mention Pampanini, 1931, 1936, 1938, Trotter 1919, Maugini 1920 and thereafter until the seventies of the last century. But the most important work of all was achieved by Al-Faateh University, Tripoli during the period 1976-1992, by publishing the Encyclopedia of Libyan flora.

In general the Libyan flora consists of about 2058 plant species, where Pteridophytes contains 15 species, Gymnosperms 12 species, Monocotyledons 411 species and Dicotyledons 1620 species. The number of endemic plant species is about 71.

Oral

Flanders discovers the Latin American botany: plant hunters, greenhouses and commercialized cultivation around Ghent (1815-1870)

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About 1800 Ghent was already reputed for its botanical garden, completed by the so-called *Frascati*-association, a club of amateur gardeners. During the unification with Holland (1815-30), the first professional nurseries obtained new species from the Dutch colonies, but mainly exotic plants imported through England.
Our 1830 Revolution cut off the overseas supplies. Very soon, several Belgian plant hunters prospected the Latin American interior, especially Brazil, Venezuela-Colombia and Guatemala-Mexico. Shortly after coming back, some of them – like L. Van Houtte, J.J. Linden and A. Papeleu – established in the surroundings of Ghent large greenhouses for tropical flowers. Here orchids, amaryllis, begonias, etc. were cultivated, crossbreed and hybridized.
These new initiatives meant the take off of the large-scale, almost industrialized market-breeding, with widely known enterprises such as the Verschaffelt brothers. Just as internationally famous were the regularly organized exhibitions, afterwards and still named the *Floralies*. Specialized publications (review, catalogues, luxurious botanical series) were also edited by the same florists.
Up to about 1870 this "botanophilia" for Latin America – sometimes a real "orchidmania" – was supported by a wealthy industrious bourgeoisie. From then onwards, African species and bastard plants replaced the former interest.

Poster

Biologie florale et diversité haplotypique de l'arbre *Pentadesma butyracea* (Clusiaceae) dans son aire de répartition en Afrique sub-saharienne

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Pentadesma butyracea Sabine est une espèce ligneuse sauvage des forêts denses humides et galeries forestières africaines. Ses graines servent à fabriquer du beurre alimentaire similaire au karité *Vitellaria paradoxa*. La surexploitation des semences, la destruction de l'habitat et les feux de végétation menacent l'espèce au Bénin et Togo. Pour mettre en œuvre une bonne stratégie de conservation, la connaissance des paramètres de sa biologie de reproduction et sa diversité génétique est requise. En 2008-2009, nous avons étudié sa biologie florale dans trois populations au Bénin puis sa diversité haplotypique dans son aire de répartition à l'aide de trois marqueurs microsatellites chloroplastiques et de séquences de l'intergène chloroplastique *psb*A-*trn*H. *Pentadesma butyracea* présente un décalage de floraison plus faible entre populations (4-12 jours) qu'entre arbres au sein d'une population (20-35 jours). Les indices de synchronisme floral Xi (0,5 à 1) et Z (0,62 à 0,89) sont élevés indiquant que beaucoup d'arbres fleurissent simultanément. Les principaux pollinisateurs sont deux oiseaux (Cyanomitra verticalis et Cinnyris coccinigastrus) et trois hyménoptères (Apis melifera, Meliponula togoensis et Hypotrigona sp). Chaque fleur produit 1042±117 µL de nectar, 69825±4680 grains de pollen et 121±22 ovules dont 90% avortent. Le ratio pollen: ovule (577,06) suggère que l'espèce est facultativement xénogame. Les arbres les plus productifs (346±392 fruits) sont ceux ayant 70 à 90 cm de diamètre. Les microsatellites chloroplastiques révèlent 17 haplotypes sur des échantillons distribués de la Côte d'Ivoire au Gabon mais seul 3 haplotypes apparaissent au Bénin. L'analyse des séquences du gène psbA a généré 12 haplotypes, dont un seul présent au Bénin, qui sont structurés en deux lignées allopatriques séparant le haut-guinéen du bas-guinéen et indiquant un isolement ancien des populations. Sur l'ensemble des marqueurs, nos résultats montrent une diversité génétique élevée dans le bas-guinéen (Gabon, Cameroun), modérée dans l'ouest du haut-guinéen, et très faible au Bénin.

Mots clés: Pentadesma butyracea, synchronisme floral, régime de reproduction, diversité génétique, lignée chloroplastique, signal phylogéographique.

Poster

The Biodiversity Heritage Library for Europe

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The Biodiversity Heritage Library for Europe (BHL-Europe) is a 3 year project (2009-2012), involving 28 major natural history museums, botanical gardens and other cooperating institutions.
The libraries of the European natural history museums and botanical gardens collectively hold the majority of the world's published knowledge on the discovery and subsequent description of biological diversity. However, digital access to this knowledge is difficult. The objective of the BHL-Europe project is to make Europe's biodiversity information available to everyone by improving the interoperability of European biodiversity digital libraries.
The project will provide a multilingual access point for biodiversity content through a global portal (BHL) with specific biological functionality and to a wide European cultural audience through Europeana.
The National Botanical Garden of Belgium will provide 50.000 pages, namely African biodiversity literature.

Oral

Conservation status of *Hydrangea seemannii* (Hydrangeaceae) in Mexico: an inference based on ecological niche modelling

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The loss of natural habitats in Mexico has increased dramatically, urging conservation actions that mitigate the negative effects of anthropogenic activities on plant diversity. This, coupled with climate change due to global warming, suggests that several species of plants will suffer changes to their current distribution in the coming years. Ecological niche modelling allows us to estimate the current geographical distribution of organisms as well as to produce predictions for the future, being an important tool in assessing the conservation status of certain species. The root climber *Hydrangea seemannii* L. Riley is endemic to the temperate forests of northwest Mexico, between 2100 and 2700 m altitude, and is the only representative of section *Cornidia* distributed in the temperate region of the northern hemisphere. It grows mainly on mature trees of different species of Gymnosperms that are highly appreciated and exploited for their wood. Although this species has not been considered in any risk category by the Mexican Official Norm (NOM-059), field observations suggest that populations of *H. seemannii* are being affected by the increased harvesting of their hosts. The present work uses the ecological niche modelling with the method MAXENT (Maximum Entropy) to estimate the current geographical distribution of *H. seemannii* and future projections for two periods of time (2020 and 2050). We discuss the conservation status of the species and suggest some actions to be taken by the Mexican authorities in order to counteract the effects of human activities on it.

Oral

New insights on species delimitation and species history using phylogeographic approaches and DNA barcodes in Central African plants

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Molecular genetic tools are now widely used in plant systematics to reconstruct phyletic relationships at all taxonomic levels. They have also recently been proposed to identify samples to species level using DNA barcodes. However, closely related species that have not sufficiently diverged or that are prone to hybridization may render phylogenetic inference very complex and may cause DNA barcodes to become ineffective. These cases require a phylogeographic approach whereby populations rather than species are considered as evolutionary units. Such an approach is also very valuable to test biogeographic hypotheses at the species level. Despite their interest, phylogeographic approaches have rarely been applied to plant species from African forests. Using various plant species from the African rain forest, I will illustrate how chloroplastic and nuclear genetic markers help to delimit species boundaries, to understand speciation processes, to test the Pleistocene refuge hypothesis, or to assess the extent of seed and pollen dispersal. I will also discuss the limitation of current plant DNA barcodes for species identification.

Poster

Kyllinga cataphyllata (Cyperaceae), a new species from the Highlands of West and Central Africa

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Kyllinga cataphyllata Huygh & Schouppe, a new species of Cyperaceae from the highlands of Western and Central Africa, is described and illustrated. This new species is easy recognized by the ascending rhizome densely covered by large cataphylls. The head-like inflorescence consisting of a single spike with spikelets made up of two to three glumes and only one flower, and the glumes characterized by a spinulose greenish keel. It is closely related to *K. brevifolia* Rottb., but differs in having conspicuous cataphylls, glumes with a strongly toothed keel and an asymmetrical pedicel to the nutlet.

Oral

Conventional and modern approaches for using genetic diversity in crop improvement: the case of cassava (*Manihot esculenta*) in Sub-Saharan Africa

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Cassava (*Manihot esculenta* Crantz) is a starchy root crop grown in tropical and subtropical climates and the primary staple for over 800 million people worldwide. Native to South America, cassava was introduced into Africa by Portuguese traders in the late 16th century. Nowadays, cassava plays an essential food security role in Sub-Saharan Africa due its ability to grow under adverse climatic conditions and on marginal lands. In addition to food, cassava also has important industrial uses for the production of starch-based products, alcohol and animal feed.

Like most vegetatively propagated crops, cassava is highly heterozygous with low rates of flowering, thus rendering conventional breeding arduous. Wild species constitute potential gene reservoirs for the genetic improvement of cultivars. In case of cassava, plant breeders have used wide crosses with wild *Manihot* species to introgress resistance to the Cassava Mosaic Disease, a devastating viral disease that nearly wiped out cassava production in many African countries during the 1980's and 90's. More recently another viral disease has emerged, the Cassava Brown Streak Disease, posing a new threat to cassava production in Sub-Saharan Africa.

The advent of modern molecular methods offers a new tool box for the genetic characterization and improvement of cassava to complement conventional approaches. An overview will be given of past accomplishments in cassava breeding for combating viral diseases, their impact on food security in Sub-Saharan Africa as well as an update on molecular and plant tissue culture approaches that are being developed and used for the conservation, characterization and genetic improvement of this important crop in Sub-Saharan Africa.

Poster

Flore d'Afrique centrale (D.R.Congo-Rwanda-Burundi): state of the art and perspectives

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About 60% of the plant diversity of D.R.Congo, Rwanda and Burundi has been described since 1948 in the series Flore d'Afrique centrale. In an attempt to improve the accessibility of floristic information for Central Africa and to accelerate the production of the Flore d'Afrique central, new printed and electronic formats have been developed. The existing volumes have been scanned and are now available at the website of the National Botanic Garden of Belgium: http://www.botanicgarden.be.

The new print format includes distribution maps and phylogenetic information on family and genus levels besides elaborate descriptions and complete synonymy. Each printed volume will also appear in an electronic format available at the Flora's homepage with additional media content such as images and multi-access keys.

Poster

Boyekoli Ebale Congo 2010: documenting the diversity of vascular plants of the Congo basin

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Home to the world's second largest rainforest, the Congo basin is a hotspot of plant diversity under high anthropogenic pressure by unsustainable use of its natural resources. The interdisciplinary expedition along the Congo River "Boyekoli Ebale Congo 2010" was an important opportunity for Congolese and European botanists to document during two months the current diversity of vascular plants in parts of the rainforest that are otherwise difficult to access.
Documenting the diversity and distribution of plant species, most of which have an intrinsic ecological or economic value, is a prerequisite to meaningful conservation planning and explicitly mentioned as an objective in UNEP's Global Strategy for Plant Conservation (GSPC). We present the approach and methods the expedition's botany team applied to address this objective of GSPC for vascular plants, i.e. ferns and flowering plants, give an overview of the material acquired for research purposes during the expedition and discuss expected outcomes of future work on these collections.

Poster

Ecologie et distribution des rotangs en forêt tropicale (Réserve Forestière de Yoko, République Démocratique du Congo): implications sur la gestion durable de la ressource

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Les rotins comptent parmi les principaux produits forestiers autres que le bois d'œuvre utilisés par les populations riveraines à la Réserve Forestière de Yoko (R.D.Congo, Province Orientale). Ils constituent une source non négligeable de revenus et un secteur informel très actif basé sur l'approvisionnement de la ville de Kisangani (1 million d'habitants) en cannes ainsi que leur transformation. Nous présentons dans ce papier les résultats de notre étude sur les produits forestiers autres que le bois d'œuvre (PFAB) utilisés par les populations riveraines à la Réserve Forestière de Yoko, notamment les aspects biologiques et écologiques. Il s'agit des données de base utiles à l'évaluation de la durabilité de la récolte et du commerce des rotins. En plus, nous possédons des quantités importantes de données socio-économiques que nous allons utiliser juste pour vous donner un aperçu sur les enjeux à jouer. Sur base d'une série de travaux de terrain menés sur un échantillon de placettes permanentes et de transects établis dans la réserve de Yoko, nous présentons:
La diversité des rotangs répertoriés dans la Réserve;
La distribution spatiale de deux espèces les plus importantes (*Eremospatha haullevilleana, Laccosperma secundiflorum*) en fonction des divers types forestiers trouvés au sein de la Réserve et leur niveau de dégradation (ouverture de la canopée);
Les données de la croissance des deux espèces cibles (accroissement de la tige, dynamique des touffes) avec et sans récolte.
Partant des résultats ci-dessus et des données socio-économiques, des directives de gestion durable de la ressource pourront être définies non seulement pour la forêt de Yoko, mais pour des forêts similaires en R.D.Congo.

Mots clés: Rotangs, République Démocratique du Congo, écologie, croissance, distribution spatial, durabilité.

Poster

Le rotin: une alternative à l'utilisation des meubles en bois dans les ménages de Kisangani (République Démocratique du Congo)

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Très fréquent dans les formations forestières de la région de Kisangani, le rotin constitue l'un des principaux produits forestiers non ligneux présent dans les ménages sans distinction de rang social. Il intervient dans la fabrication d'une gamme variée d'articles, dans l'alimentation, la santé et fournit des cordes dans la construction des maisons et enclos divers.
Les articles en rotin fabriqués dans les ateliers de la place sont commercialisés par de jeunes gens et font l'objet d'une forte demande auprès des ménages, mais se butent à un sérieux problème de qualité et, par ricochet, de dureté. Une enquête a été menée auprès de 556 ménages urbains abritant 4.420 personnes au moyen d'un questionnaire administré selon la technique de sondage aréolaire adaptée à la cartographie, à l'étendue et au niveau d'urbanisation des entités administratives étudiées.
L'enquête révèle une fréquence 98% pour les articles en rotin dans les ménages et que ceux-ci sont différemment appréciés et butés à une forte concurrence des objets en plastique, plus souples et plus esthétiques. Au total 89% de ménages préfèrent le bois par rapport aux autres matériaux, mais s'il faut choisir entre le rotin et le plastique, le choix penche plutôt en faveur des meubles en plastique plus esthétiques et relativement plus durs. Enfin, les analyses statistiques ont révélé que leur durée de vie est fonction du type d'article, des Communes, de la charge familiale et du sexe ratio.
Des efforts sont à fournir pour améliorer le secteur rotin en République Démocratique du Congo et rendre les articles en rotin plus solides et plus compétitifs sur le marché tant national qu'international des meubles. C'est à ce prix que cette "ressource d'avenir" pourra contribuer à sauvegarder dans une large mesure les formations forestières périurbaines de la ville de Kisangani avec leurs essences et éventuellement contribuer à leur conservation durable.

Mots clés: Rotin, bois, ménage, Kisangani.

Poster

Biologie et culture d'un produit forestier non ligneux, le kimbiolongo (*Mondia whitei*, Apocynaceae) au Bas-Congo (R.D.Congo)

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Le kimbiolongo, *Mondia whitei*, est classé parmi les plantes médicinales les plus importantes d'Afrique; l'espèce (racines et feuilles). Les racines constituent l'aphrodisiaque le plus fréquemment vendu à Kinshasa et dans les grandes villes du Bas-Congo. Le kimbiolongo est à la fois un médicament et un aliment car ses feuilles sont consommées comme légume. Le kimbiolongo a été mis en culture dans différents types de sols en août 2008, à Luki, à 5°36' de latitude sud et 13°7' de longitude est, à 200 m d'altitude, sur des tuteurs de 2 m.
Les principales phases de développement suivantes ont été mises en évidence:

Phase A: phase plantule, à feuilles elliptiques et aiguës à la base

Phase B: apparition de flagelles

Phase C: tige volubile avec feuilles cordées. La production de racines tubérisées et de feuilles est maximale à la fin de cette phase

Phase D: apparition de boutons, caractérisée par l'arrêt de croissance du flagelle

Phase E: floraison, en décembre 2009, soit après 18 mois de reprise

Phase F: fructification, durant les 4 mois suivants

Les connaissances accumulées durant cet essai de cultures permettent de proposer les meilleures modalités pour la multiplication végétative et générative de cette plante médicinale et pour la production des organes utiles en pharmacopée et en alimentation. Des analyses chimiques de cette espèce sont en cours au Laboratoire de pharmacognosie de l'ULB.
La racine de *Mondia whitei* est séchée à l'étuve ventilée à 50 C, à l'abri de la

lumière, puis pulvérisée. La poudre est ensuite épuisée par percolation de solvants de polarité croissante: n-hexane – dichlorométhane – méthanol – eau. Les fractions sont récoltées dans des vials et évaporées à sec. La recherche des espèces phytochimiques est effectuée par CCM ou par réaction en solution. Les résultats sont consignés dans le tableau ci-dessous:

	Extrait au n-hexane	Extrait au ichlorométhane	Extrait au méthanol	Extrait aqueux
Alcaloïdes			+ [a]	
Terpenoïdes et stéroïdes	+	-	-	-
Flavonoïdes	-	+	-	-
Saponines				- [b]
Tanins	-	+	+	+ [c]
Anthraquinones	-	-	+	+

[a] = extrait alcaloïdique réalisé à partir de méthanol acidifié.
[b] – extrait aqueux réalisé par décoction. Test réalisé sur le décocté. Indice de mousse < 100.
[c] = aussi positif sur le décocté.

Oral

Accounts of tropical nature in scientific expeditions (18th and 19th centuries)

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The descriptions of the tropics written by men of science and by naturalists of the 18th and the 19th centuries have significant features in common. European traditional heritage played an important role on the construction of the scientific knowledge about hot climates. Medical theories, old travel narratives and philosophical writings formed a solid basis to the understanding of tropical nature. However, at that time, naturalist-travelers started to stress the specificity of different tropical regions. Text and visual descriptions indicated the same requirement: register of the variety of landscapes, plant physiognomies, flora and fauna, as well as of the physical diversity of the inhabitants. A sort of "biogeography" was already in place even if it wasn't yet named. A travel account comprehends descriptions of many "organic" places, composed by a set of climatic, topographical, cultural, floral and faunal data. Several kinds of representations - iconographies, texts, collectables for the museums -make up a representation for a particular place. A travel account can be the report of a geographical displacement and the register of the variation of life according to each particular space. The word "tropical" defines a large amount of characteristics of a place, but it was not sufficient to embrace all the relevant circumstances that naturalists were dealing with.

Poster

In vitro conservation of *Maesa* species

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Maesa argentea, Maesa balansae, Maesa lanceolata and *Maesa perlarius* (Myrsinaceae) are shrubs or small trees growing in the tropics of Africa and Asia. All four species have an important role in traditional medicine and ancient healing practices (Wiart 2006). *Maesa lanceolata* is well known in Rwandan traditional medicine where the extracts of leaves and fruits are used against various diseases including hepatitis, dysentery, skin diseases, ozena and neuropathies. In East African folk medicine, *Maesa lanceolata* is also used to prevent cholera.

Investigation of the methanol extract of dried leaves of different *Maesa* species resulted in the identification of a triterpenoid saponin mixture. *In vitro* bioactivity assays have shown that *Maesa argentea, Maesa balansae, Maesa lanceolata* and *Maesa perlarius* have virucidal, cytotoxic and anti-leishmanial actions. The potency of the saponins is comparable to that of the commercial drug against leishmaniasis, liposomal amphotericin B (Maes et al. 2004).

There are, however, many difficulties accompanied with conventional production and harvesting of *Maesa* spp. material. The use of *in vitro* tissue culture technology is an attractive alternative for improving the propagation and the enhancement of production of rare medicinal plants.

In the present study, different types of *in vitro* cultures were established and evaluated for the medicinal plants *Maesa argentea, Maesa balansae, Maesa lanceolata* and *Maesa perlarius*. Adventitious shoot induction is stimulated in the presence of the cytokinin thidiazuron (TDZ). Adventitious rooting occurs in cytokinin free medium in the presence of different types of auxin. The saponin content of in vitro tissue cultures and regenerated plants is similar, indicating that the secondary metabolism leading up to saponin production is constitutive and not strongly influenced by the environmental conditions.

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Poster

C_3 *Cyperus* (Cyperaceae)

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Cyperaceae contribute significantly to the botanical diversity of wetlands. In Cyperaceae, the *Cyperus* clade (Cypereae tribe) includes ca. 950 species of grass-like plants with complex inflorescences. In this study both nuclear ribosomal and plastid DNA markers are used to create a molecular phylogenetic hypothesis of the *Cyperus* clade. The molecular phylogenetic data are combined with embryology, anatomy, carbon isotope analysis ($\delta^{13}C$), morphology, ontogeny of flowers and spikelets, and biogeography. The *Cyperus* clade consists of a paraphyletic genus *Cyperus* s.s. (ca. 700 spp.) as core genus, in which 13 segregate genera are nested. Species of this clade either use C_3 photosynthesis (eucyperoid anatomy) or C_4 photosynthesis (chlorocyperoid anatomy). The C_3 species form a grade at the basis of the *Cyperus* clade (C_3 photosynthesis is the plesiomorphic state for the *Cyperus* clade), in which a well-supported monophyletic clade is nested encompassing all C_4 species. *Cyperus* C_3 species (ca. 150 spp.) are less species rich and less diverse than *Cyperus* C_4 species (ca. 800 spp.). The *Cyperus* C_3 group includes the small genera *Courtoisina*, *Oxycaryum* and *Kyllingiella*, while *Androtrichum* is either sister to the *Cyperus* clade or its most basal taxon. These taxa are recognised at genus level due to specific characteristics which differentiate them from *Cyperus* s.s. The currently recognised supraspecific taxa in C_4 *Cyperus* are generally well-supported in the molecular phylogeny. The previously recognised C_4 *Cyperus* section *Elegantes (Glutinosi, Viscosi)* was proven to be heterogeneous as it includes both C_3 and C_4 species. Ultimately, we aim to provide a detailed revision of the *Cyperus* C_4 group and propose a new classification with clearly characterised monophyletic groups.

Poster

Etat d'avancement de la Flore des plantes vasculaires des districts de Kisangani et de la Tshopo (R.D.Congo)

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Un projet de Flore de la Tshopo a été élaboré. Il concerne les Districts de Kisangani et de la Tshopo (199.567 km²) où se trouvent les villes de Kisangani et de Yangambi. Il s'agit des districts de la R.D.Congo qui sont parmi les mieux explorés au point de vue botanique. Les premières familles ont déjà été publiées dans les Annales de la Faculté des Sciences de Kisangani. Environ 70 familles ont été publiées séparément dans Taxonmania depuis 2006; la description des espèces est suivie de la distribution au sein du District de la Tshopo; elle est effectuée en citant les échantillons d'herbiers classés par territoire. Ceci aidera aussi pour l'actualisation des noms à l' herbarium de Yangambi (150.000 échantillons) où il n'y a pas eu de mise à jour taxonomique et nomenclaturale depuis 1960. Depuis lors, la classification a évolué et beaucoup de noms scientifiques latins ont changé. Un répertoire des lieux de récolte et localités pour la Flore de la Tshopo a été publié récemment (Ndjele 2006); il facilite l'attribution de chaque lieu de récolte au territoire correspondant. Cette flore locale pourrait être terminée en moins de quatre ans. L'objectif est de produire un volume unique avec clés de détermination des espèces et courte description, rassemblant l'ensemble des familles et permettant à un grand nombre d'utilisateurs l'identification raisonnée de la flore de ces deux Districts.
Le Catalogue des plantes vasculaires des Districts de Kisangani et de la Tshopo a été récemment mis à jour (Lejoly et al. 2010) et publié dans Taxonomania. Il s'agit de la 4ème édition entièrement revue et augmentée, incluant les clés et la distribution pour 70 familles; elle a été partiellement réalisée dans le cadre de la composante forestière du projet "Relance des recherches agricoles et forestières en République démocratique du Congo" (REAFOR-RDC), de l'Union européenne, pilotée par le Cifor et gérée par la FAO.

Mots clés: R.D.Congo, Tshopo, Flore.

Poster

Analyse de la diversité floristique dans les diverses strates des forêts denses de la Réserve forestière de Masako, Kisangani, R.D.Congo

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Le présent travail est le résultat d'une étude floristique réalisée dans les diverses strates des forêts denses de la réserve forestière de Masako. Il avait pour but de recenser et comparer la richesse spécifique de chaque strate dans les deux types forestiers; d'analyser les relations entre les strates et enfin d'estimer les paramètres de structure du peuplement (densité, surface terrière, hauteur dominante et structure diamétrique des arbres). La méthode de l'inventaire en plein faisant recours à des mesures de dbh (dbh ≥ 10 cm) et la méthode de relevés phytosociologiques multistrates (relevé synusial) ont été utilisées pour inventorier les arbres sur terrain. Une superficie totale de six hectares a été mis en place dans le milieu non perturbé de la réserve forestière de Masako, dont trois hectares subdivisé en 12 parcelles de 2500 m² chacune a été installé dans la forêt primaire monodominante à *Gilbertiodendron dewevrei* et trois autres hectares subdivisé en 12 parcelles de 2500m² chacune installé dans la forêt secondaire vieille.

Les deux méthodes choisies ont permis de recenser globalement un total, de 2342 individus parmi les espèces ligneuses à dbh ≥ 10 cm, appartenant à 169 espèces regroupées en 37 familles,

L'espèce *Gilbertiodendron dewevrei* caractérise la forêt monodominante à *Gilbertiodendron dewevrei* au niveau de la strate dominante et *Coelocaryon preussii* et *Trichilia* spp au niveau de la strate dominée; tandis que les espèces *Petersianthus macrocarpus* caractérise la forêt secondaire vieille au niveau de la strate dominante et *Trichilia welwitschii* et *Petersianthus macrocarpus* au niveau de la strate dominée.

Les analyses d'ordination (logiciel CANOCO) et de classification (logiciel PAST), ont permis de différencier au sein de cette réserve au terme de similitudes des relevés phytosociologiques, deux types de forêts: la forêt monodominante à *Gilbertiodendron dewevrei* et la forêt secondaire vieille.

La diversité spécifique a montré une différence significative entre ces deux types de forêt, et aussi au terme de strate, elle semble augmenter à hauteur décroissante dans les deux cas. L'anthropisation que connait cette réserve au niveau de la forêt monodominante à *Gilbertiodendron dewevrei* est en partie responsable de la faible densité en essences ligneuses.

Mots clés: diversité, flore, strate, forêt dense, forêt monodominante, Masako.

Oral

The essential role of botanical exploration and natural history collections for informing conservation of tropical plants

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Botanical exploration conducted over the last several centuries has revealed that the vast majority of our planet's biological diversity occurs in the tropics, yet many countries located within this zone are among the poorest on Earth and lack adequate capacity to document and study their rich, diverse floras. As we enter the 21st Century, these resources are coming under unprecedented pressure as a result of rapid human population growth, economic globalization, and the never-ending struggle for people to feed themselves and improve their standard of living. The need to manage our natural resources sustainably is more widely recognized than ever before, but a consensus on how to accomplish this and where to focus our efforts remains elusive. One key consideration involves identifying priority areas for conservation – sites with high levels of diversity and local endemism whose long-term protection is essential for the survival of biodiversity. Yet how can we meet this challenge in the tropics, where the our knowledge of species is so fragmentary? Recent experience from Madagascar shows that the careful compilation of data from available history collections combined with targeted botanical exploration, largely conducted by local personnel, can provide a surprisingly robust basis for identifying both key areas for protection and species most critically in need of conservation action to prevent their extinction.

Poster

Functional diversity in extremophile steppic savanna plant communities on copper-rich soil in Katanga (D.R.Congo)

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Steppic savannah on natural copper-enriched soil in Katanga (D.R.Congo) are extremophile ecosystems unique on the earth. Characteristic patterns of spatial variation in plant community structure are observed from the top to the base of the copper hills, possibly due to gradients of soil chemical composition (especially Cu). Objectives: to examine how plant functional traits vary along gradients of soil composition and to test if functional trait variation along the gradient is due to species turnover or phenotypic plasticity.
Methods: 40 1-m² plots have been sampled for plant community composition, soil composition and plant functional traits. In each plot, the following quantitative traits have been measured on two individuals per species: vegetative height, individual leaf area, specific leaf area (SLA= leaf area/leaf mass). Nominal traits have also been recorded, including growth form. Plot-averaged weighted values of functional traits have been calculated. Relationships between community-averaged functional traits and ecological factors are analysed by multiple regression and correlation analysis.
Results: i) in addition to increasing soil Cu, many other edaphic factors vary gradually from the base to the top of copper hills including increasing moisture, P, organic matter, and stone content. ii) Community-averaged plant height and leaf area decrease significantly from the base to the top. In contrast, specific leaf area increases.
iii) Relative frequencies of different growth forms change significantly, i.e.: increase in percentage cover of annuals, decrease in percentage cover of geofrutex.
iv) Soil Cu is the most influential factor on leaf area, but variation in SLA is mostly driven by soil P and variation of plant height by soil stone percentage.
v) Interestingly, response of individual species along the gradient is in the same direction as the community-averaged response for height and leaf area (decreasing from base to top), but in opposite direction for SLA (species: decrease from base to top; community: increase from base to top). This suggests that both phenotypic plasticity and species turnover contribute to the variation of community-averaged plant height and leaf area, while species turnover alone (i.e. increased proportion of annuals) mostly explains increasing SLA along the slope.

Poster

Analyse structurale de *Scorodophloeus zenkeri* Caesalpiniaceae) et impact de l'écorçage dans la région du Sud Cameroun

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L'étude est réalisée dans les campements pygmées Bakola du village Ngoyang, près de Lolodorf, Région du Sud Cameroun. L'objectif était de d'évaluer la disponibilité de la ressource, l'impact de l'écorçage et la pression exercée sur la ressource. L'inventaire est effectué dans cinq poches de forêt où cette espèce pousse de manière grégaire. Cinq transects de largeur 20 m et de longueur variables pour un total 6 hectares, ont permis d'inventoriés 531 pieds de *Scorodophloeus zenkeri* Harms ayant un diamètre supérieur ou égal à 10 cm. La densité moyenne est de 88 pieds à l'hectare. L'écorçage faite pour des besoins de consommation domestique est très peu perceptible (0,9%). Mais l'écorçage destiné au commerce est faite après abattage systématique des arbres. 69% de pieds sont sains et l'effectif est décroissant au fur et à mesure que les classes de diamètre s'élèvent. Plus les diamètres deviennent importants, de plus en plus ils sont testés; ces tests laissent des ouvertures sur le tronc et les exposent aux diverses attaques d'insectes. Il est noté un taux élevé d'arbres infectés rencontrés dans les classes de diamètre supérieur à 35 cm (25%). Les arbres attaqués représentent près de 6% de l'ensemble. Les arbres de grands diamètres (35-96 cm) sont systématiquement abattus et constituent presque 7% des arbres inventoriés et 21% des arbres supérieurs à 35 cm. L'abattage est donc sélectif et se fait essentiellement sur les arbres de grands diamètres ayant une écorce épaisse et facile à enlever. C'est dans cette tranche que l'on retrouve le plus grand nombre de semenciers. Cette situation pose un problème avenir pour la régénération de cette espèce qui aura à long terme perdu le stock d'individus capable d'assurer la fructification nécessaire pour la régénération naturelle d'autant plus que cette fructification ne se fait pas tous les ans alors que le flux de l'écorce vers les principales villes est permanent et les sites de récolte s'éloignent des campements.

Mots cles: Pygmées bakola, Lolodorf, abattage, écorçage, *Scorodophloeus zenkeri*, inventaire.

Poster

Etude écologique d'une espèce importante pour l'alimentation des populations forestières: cas du noisetier d'Afrique (*Coula edulis*) à l'est du Gabon

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Cadre de l'étude: Concession Forestière sous Aménagement Durable de la CEB-Precious Woods (616.700 hectares) à l'est du Gabon.
Objectif: Description de la phénologie de l'essence et caractérisation de la pluie de graines de *Coula edulis* Baill.
Méthodologie:
Etude de la phénologie: 150 tiges réparties sur 5 classes de diamètre ([5-10 cm [, [10-20 cm [, [20-30 cm [, [30-40 cm et [≥ 40 cm]) ont été suivies depuis 2009 (16 mois). Les rythmes de feuillaison, de floraison et de fructification ont été suivis mensuellement.
Estimation quantitative de la pluie de graines: 14 semenciers ont été suivis durant une saison de production (janvier à avril 2010); 14 collecteurs circulaires ont été installés. Chaque collecteur présente une surface correspondant à la projection du houppier au sol. Les données récoltées hebdomadairement portaient sur le nombre et la masse des fruits.
Résultats et discussion:
La floraison a lieu entre juillet et décembre (grande saison sèche et saison de pluies). La fructification intervient entre janvier et mai à cheval entre la petite saison sèche et la saison de pluies. La défeuillaison et la feuillaison sont des phénomènes concomitants qui se déroulent durant toute l'année.
Les premières fructifications apparaissent sur les semenciers à partir de ≥ 10 cm dhp de diamètre. La production moyenne fruitière par arbre de *C. edulis* est de 1,332 kg et de 34 fruits pour l'ensemble de la période de fructification. Les quantités de fruits produits (nombre et masse) sont très variables d'un arbre à l'autre. Ces résultats constituent les premières données sur la production fruitière de *Coula edulis*.
La floraison devient massive et régulière pour les arbres de ≥ 30 cm dhp de diamètre. Ce chiffre correspond à la première estimation du diamètre de fructification régulière pour cette espèce.

L'irrégularité de la fructification qui a été observée chez *Coula edulis* (Hecktweiler 1992) mériterait d'être confirmée.
Comparativement à certaines essences phares comme l'okoumé ou le moabi, *C. edulis* présente un faible diamètre de fructification régulière (55 et 70 contre 30 cm). Cela augure une fixation d'un diamètre minimum d'exploitation qui tiendrait compte à la fois de l'exploitation du bois et de la production alimentaire.
Conclusion: Ces données originales sur la phénologie et l'évaluation de la production de *Coula edulis* constituent des outils de base pour la gestion de cette espèce fruitière et de son exploitation durable.

Oral

The algal diversity of Lakes Nakuru and Elmenteita (Kenya, East Africa)

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In Lake Nakuru, our objectives were the study of the variation of the physico-chemical parameters of the water during successive years, simultaneous study of algal composition, algal distribution at different sites, horizontal and vertical distribution of diatoms and successions of diatom assemblages in the lake. In Lake Elmenteita, we studied the diatom richness and the ecological groups along a transect N-S.

The physico-chemical parameters (pH, temperature, conductivity, dissolved oxygen) were measured on the field. The algal composition carried on 145 samples collected from 1995 to 2000 from different sites in Lake Nakuru, from 21 samples of surface sediments collected in September 2004 from Lake Elmenteita and 4 diatom samples from hot springs in Lake Elmenteita in December 2000.

For diatom analysis, permanent slides were made using Naphrax or DPX and 300 frustules were counted for each sample with a Leica microscope. Cyanobacteria and green algae were studied from fresh samples. Multivariate analysis (ordination and classification) were used for the study of the ecological groups.

The study indicated the variation of the physico-chemical parameters in Lake Nakuru, the presence of 201 taxa of which 155 belonging to the Bacillariophyta. The different figures related to the physico-chemical composition of Lake Nakuru, the vertical and horizontal distribution of diatoms indicated that the lake was heterogeneous during the period of this study. Diatom successions clearly were observed in Lake Nakuru and three ecological assemblages were identified. Some samples were dominated by cyanobacterial blooms. The study pointed out that few samples contained *Spirulina* spp. and *Anabaenopsis arnoldii* considered by many authors as dominant species in the algal flora of saline lakes of East Africa, indicating that diatoms may form the major food for the population of lesser flamingos. A multivariate analysis involving 35 samples of diatoms and the physico-chemical parameters showed a gradient of sites according to pH.

The study of Lake Elmenteita indicated a diatom diversity of 64 species, samples collected from the hot springs contained 57 species. The classification using the Sorensen's coefficient indicated a high similarity between the samples.

Oral

On the recent origin and assembly of the African savanna biome – evidence from dated phylogenies

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Much of the tropical eastern Africa landscape is dominated by C4 grasses with scattered trees and accompanying herbivores. This biome, the African savanna, evolved recently with most of the C4 graminoids diversifying in the last 10 million years. Using dated phylogenies of characteristic plant groups (Poales, legumes), the patterns of assembly of the savanna biome are investigated. Majority of the lineages have evolved within the landscape in response to aridification and other disturbances such as volcanism, as well as enrichment from other biomes. Within the savanna, pockets of older (pre-savanna) lineages inhabit stable habits such as the granitic outcrops and the Eastern Arc Mountains and coastal forest.

Oral

Place des produits forestiers non ligneux dans l'aménagement durable de la Réserve de biosphère de Luki en République Démocratique du Congo

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Instituée en 1937 comme domaine boisé de l'État et gérée par l'Institut National d'Etudes Agronomiques au Congo (INEAC), la Réserve de Luki fut concédé au Ministère de l'Environnement, Conservation de la Nature et Tourisme en 1979 au terme de la signature de l'ordonnance n° 77-022 du 23 février 1977. Mais c'est en mai 1979 que l'UNESCO l'a reconnu comme faisant partie du réseau mondial des réserves de biosphère.

D'une superficie d'environ 33000 ha, cette Réserve constitue le prolongement de la pointe méridionale extrême de la flore du Mayumbe dont elle reste l'unique échantillon représentatif après une surexploitation pour la production industrielle de bois d'œuvre, destinée à l'exportation. Actuellement elle représente un patrimoine national et international qui vaille la peine d'être préservé.

Cette réserve présente une hétérogénéité des forêts aussi bien au niveau de leur structure que de leur composition spécifif. Huit types de forêts et une flore forestière comprenant plus de 1000 espèces sont connus. Les enquêtes ethonbotaniques menées dans les quatre villages, dans la Station MAB INERA et dans 16 points de vente ont permis de révéler 109 espèces végétales dont 41 espèces utilisées pour l'alimentation, 56 espèces contribuant à la fourniture des matières premières où sont extraits des principes actifs par les industries pharmaceutiques et aux soins de santé de populations rurales qui, aujourd'hui, font encore recours à la pharmacopée, 19 espèces pour l'artisanat et les champignons. Parmi les 45 usages médicinaux répertoriés, les plus fréquents concernent le traitement des maux suivants: l'impuissance sexuelle (7 espèces), la lombalgie (6 espèces), l'anémie (5 espèces), l'hémorroïde (5 espèces), la filariose (4 espèces), la diarrhée (3 espèces), les coliques (3 espèces), la malaria (3 espèces).

Les modes d'exploitation couramment rencontrés sont: (i) la cueillette ou le ramassage des fruits, (ii) la cueillette et/ou l'arrachagedes tiges feuillées, (iii) l'écorçage des tiges ou des racines, (iv) l'extraction du vin forestier, et (v) l'abattage des plantes.Le suivi des prélèvements a montré que de 19.074,86 kg de biomasses récoltées, 72,12% représentent les fruits de *Dacryodes edulis*, 12,66% les feuilles de *Gnetum africanum* et 10,49% les morceaux de tiges de *Eremospatha haullevilleana*, (2,74% les graines de *Cola acuminata* et 1,95%) les grains de *Garcinia kola*. Le

commerce de ces produits a généré 17886,44$ dont 56,40% représentent la vente des feuilles de *Gnetum africanum* en 65 jours.
La faune terrestre est également diversifiée, les groupes les plus représentatifs (en individus) sont les rongeurs (31,8%), les ruminants (28,6%), les oiseaux (7,8%), etc. En terme de biomasse prélevée (3.814,8 kg), les artiodactyles représentent 75,1% de biomasses. Les pholidotes, les primates et les hyracoïdes sont faiblement représentés en nombre et en biomasse. La majorité de ces gibiers sont chassés au fusil (45,96% de prélèvements) et aux pièges (44,17%). La commercialisation de 2.517,9 kg de gibiers a rapporté 3.672,32$ au niveau des points de vente en 69 jours.
La faune ichtyologique, jadis riche, est actuellement en péril suite aux pratiques de capture incompatibles avec un développement durable de la biodiversité. Les études menées au cours de ces dernières années ne signalent que l'existence de 9 espèces de poissons dans les rivières que renferme cette réserve. Ces produits constituent une des principales sources, sinon la principale source de protéines animales pour les populations riveraines. Le prélèvement se fait, soit par la chasse pour le gibier, soit par pêche pour les poissons.
L'ensemble de ces produits représente aux yeux des populations, la manifestation la plus évidente de la valeur de la forêt en tant que capital-nature. En plus, à travers diverses filières informelles, ils offrent des opportunités d'emplois et engendrent des revenus aux nombreux acteurs impliqués dans leur exploitation et leur commercialisation.
Leur offre est fonction de la saisonnalité des produits. La fixation des prix se fait suivant la loi de l'offre et de la demande et également des autres facteurs notamment du coût de revient, de la qualité du produit (état de périssabilité), de la dimension ou grosseur du produit ainsi que du coût de transport.
Leur valorisation est liée la détérioration des facteurs économiques intérieurs et extérieurs et par les efforts faits pour conserver les forêts tropicales et la biodiversité. Cette détérioration a été le frein de certaines importations mais elle a permis aux populations riveraines de puiser davantage dans leurs propres ressources naturelles pour leur survie.
L'organisation de la filière commerciale fait intervenir différents acteurs dont les principaux sont: les villageois producteurs (cueilleurs ou récolteurs, ramasseurs, chasseurs, pêcheurs), les commerçants grossistes, les demi-grossistes et/ou les commerçants détaillants et les consommateurs. Aucune structure organisationnelle et professionnelle n'a été enrégistrée pendant l'étude. Dans ce marché, le transport est le facteur limitant dans la mesure où les producteurs ont à la fois à affaire à la loi de l'offre et de la demande et à la loi de l'offre et du transport. Si l'offre est moindre, le transport se fait rare, et si le transport se fait rare, l'offre diminue.
Malheureusement, l'importance économique attribuée à ces produits a conduit à des prélèvements intenses et aux méthodes d'exploitation inadéquates à la durabilité des ressources. L'activité cynégétique en est un exemple frappant qui

a, d'abord favorisé l'abandon de la chasse traditionnelle au détriment de la chasse commerciale, écologiquement destructrice par ses techniques de captures et qui a ensuite occasionné un appauvrissement perceptible de la réserve en mammifères de grande taille pour ne laisser place qu'aux animaux de petite taille, essentiellement les rongeurs.

L'intensification des prélèvements présente également une autre conséquence malheureuse contre la réserve: l'avancement des extractivistes vers la zone à protection intégrale où la richesse en produits convoités est plus grande. Ce qui traduit l'empiétement du statut juridique de cette réserve.

L'exploitation des PFNL est donc une arme à double tranchant: bénéfique d'un côté, car elle donne et apporte de la valeur à la forêt sur pied; et préjudiciable d'un autre côté, parce qu'elle augmente le danger d'une utilisation excessive au fur et à mesure que les produits deviennent économiquement plus lucratifs.

Cette situation justifie la préoccupation absolue de sauver la réserve, seul témoin de la richesse floristique et faunique de la région forestière de Mayumbe. Mais cette protection est une entreprise qui ne pourra réussir qu'en trouvant des solutions alternatives pour la population locale. Elle doit donc être conçue dans le cadre d'un programme d'aménagement interdisciplinaire intégrant les intérêts des riverains et les facteurs de l'environnement pour une gestion durable des ressources biologiques que nrenferment cette réserve. Pour cela, il est nécessaire de s'appuyer sur des approches stratégiques concernant l'intégration tous les produits forestiers utiles dans le plan d'aménagement et la participation active des riverains.

Les solutions de rechange à envisager ne pouvent être efficaces qu'en faisant appel à la connaissance approfondie de toutes les ressources exploitées dans la réserve (champignons, chenilles, miel, évaluation quantitative des populations animales existantes et de leur capacité de reproduction etc.).

Poster

Diagnostic de l'exploration botanique des Caesalpinioideae et Mimosoideae de l'Afrique centrale

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Cette étude porte sur deux sous familles de Fabaceae: les Caesalpinioideae et Mimosoideae. Les Fabaceae constituent la troisième famille la plus importante des plantes à fleurs. Elle revêt une importance au niveau taxonomique, économique qu'écologique. La présente étude a pour objectif la présentation de l'état des connaissances sur l'exploration botanique et la distribution des Caesalpinioideae et Mimosoideae de l'Afrique centrale (soit le Burundi, la République Démocratique du Congo et le Rwanda). Elle a consisté à la vérification de la détermination et des synonymes, l'ajout des coordonnées géographiques et la digitalisation dans une base de données de tous les spécimens d'herbiers conservés au Jardin Botanique National de Belgique (BR) et à l'Université libre de Bruxelles (BRLU). Ces collections représentent plus de 50% des collections faites dans cette région. Les systèmes d'information géographique ont été utilisés pour étudier la distribution géographique des espèces suivant un système de maillage en utilisant une résolution spatiale de 1°. Le nombre d'échantillons issu de l'analyse des données est 10962 échantillons récoltés entre 1837 et 2007. L'analyse des échantillons a permis de répertorier 197 espèces de Caesalpinioideae et 81 espèces de Mimosoideae. La connaissance des espèces a été possible grâce à 466 récolteurs pour les Caesalpinioideae et 456 pour les Mimosoideae. La distribution spatiale des échantillons montre que les espèces sont inégalement distribuées. La majorité des inventaires a été faite dans les localités faciles d'accès dont la proximité des principaux centres de recherche, des routes ou des voies navigables. Les zones les mieux échantillonnées sont les localités autour des centres de recherche de

Yangambi et l'Université de Kisangani, Luki, Eala, Lubumbashi, Mulungu, les alentours de Bujumbura, Butare et Kigali. Conscient de l'effet d'artefact dans l'échantillonnage et eu égard aux potentialités biologiques de notre zone d'étude, nos résultats serviront à des études biogéographiques et à la réorientation des futures investigations des régions moins échantillonnées.

Poster

Le genre *Lentinus* au Cameroun: diversité, morphologie et enzymes extracellulaires

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Le genre *Lentinus* (Fr.) Fr. constitue l'un des groupes de champignons saprophytes lignivores communs en zone tropicale. Les espèces de ce genre sont économiquement importantes car elles causent la pourriture blanche du bois grâce aux enzymes extracellulaires et certaines sont utilisées comme aliment ou médicament. Malgré leur présence dans les écosystèmes camerounais, peu de travaux leurs ont été consacrées. La présente étude est une contribution à la connaissance du genre *Lentinus* au sens strict dans ce pays à travers leurs morphologies et les enzymes extracellulaires que produisent les espèces de ce genre. Pour cela, les caractères macroscopiques et microscopiques des spécimens frais et d'herbiers (K(M), E et BR) collectés principalement à Yaoundé, dans la Réserve de Biosphère du Dja, dans la Réserve Forestière de Mbalmayo, au Parc National de Korup et aux environs du Parc National de Nki ont été étudiés. Le mycélium de certaines espèces a été cultivé et les tests d'enzymes extracellulaires y ont été effectués par la méthode des taches colorées. Au terme de ces travaux, 7 espèces réparties dans 3 sections ont été identifiées; à savoir: *Lentinus retinervis* dans la section *Tigrini*, *L. cladopus*, *L. sajor-caju* et *L. squarrosulus* dans la section *Rigidi* et *L. brunneofloccosus*, *Lentinus* cf. *badius* et *Lentinus* sp. dans la section *Dicholamellatae*. *Lentinus* sp. comporte les hyphes connectives associées aux pleurocystides. Les tests d'enzymes extracellulaires ont montré que ces espèces causent la pourriture blanche du bois en produisant principalement la laccase. Parmi ces espèces, *L. squarrosulus*, *L. brunneofloccosus*, *L. cladopus* et *Lentinus* cf. *badius* sont consommées par les populations locales. La présence au Cameroun, des espèces comme *Lentinus* sp. avec des caractères jusqu'ici inconnus dans ce groupe, suggère la nécessité d'une révision taxonomique de ce genre avec une attention particulière sur les spécimens d'Afrique.

Mots clés: *Polyporaceae*, Basidiomycotina, phénoloxydases, Ethnomycologie, Afrique Centrale.

Oral

Phytoplankton diversity analysis in a floodplain wetland along a ten-year period: different scales and approaches

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Wetlands are important conservation sites; notwithstanding, the relevance of microalgae to the current debate on biodiversity and the identification of the mechanisms driving their occurrence and distribution in such systems are still not assessed. For the past decade we studied the phytoplankton in a vegetated floodplain wetland of the Lower Paraná River using different approaches and temporal and spatial scales. We conducted field surveys along the different habitats of the wetland on a fortnightly, monthly and annual basis and performed experiments using *in situ* micro and mesocosms. In the diversity analysis of phytoplankton we considered the levels of species and higher taxonomic ranks, their functional groups and physiological and morphological traits.

Substantial differences were evident along the different habitats of this wetland as characterised by the degree of dominance of the macrophyte vegetation. Floating plants dynamics was extremely important in shaping the spatial and temporal changes of the composition and structure of phytoplankton; seasonal floods homogenised such differences.

Poor underwater light climate determined the dominance of shade adapted slow growing species with high surface:volume ratio, mainly Oscillatoriales. Conversely, light availability favoured small fast growing unicellular green algae or centric diatoms and flagellates (cryptophytes and euglenophytes). By mimicking short-term (few days) wind driven displacements of floating plants we observed different responses regarding phytoplankton diversity. Light conditions also caused differences in the photosynthetic picoplankton structure among systems: in the dark anoxic environments anaerobic anoxygenic photosynthetic bacteria dominated over phycocyanin rich picocyanobacteria and picoeukaryotes. On the other hand, the floating macrophyte cover was strongly affected by water level fluctuations in the long-term (over the decade) and produced a gradual and slow increase in phytoplankton abundance that was accompanied by a notable change in its composition and structure. The diverse flora in the largest floodplain lake of the wetland was replaced by few big-sized species of Cyanobacteria after a prolonged low water period. A combination of factors, namely nutrient concentrations, light conditions and prevailing pH values account for the occurrence and final dominance of N-fixing Nostocales.

Oral

Can models based on inventory, climate and satellite-derived data predict tree alpha diversity of African rain forests?

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Two models were constructed to predict and map tree alpha diversity of African lowland rain forests using climate data and remote sensing data: a linear regression (OLS) and the random forests model (RF). The training dataset consisted in alpha-diversity measures for trees with diameter ≥ 10 cm in 573 inventory plots in mature forest. The prediction reliabilities of these two models were evaluated using a novel approach and compared to that of a kriging model based on geographical location alone (latitude and longitude). The three models provided similar predictions of alpha diversity in well sampled areas but not in non-inventoried locations. The predictive power of the kriging model was comparable to that of the two other models. The reliability of the predictions decreased with distance from points with inventory data, becoming very low at distances > 50 km. According to inventory data and to the reliable areas within the data-driven model predictions, Atlantic Central African forests display a higher mean alpha diversity than West African forests. The lower alpha tree diversity in West Africa versus Atlantic Central Africa probably reflects a richer regional species pool in the latter. Our results emphasize and illustrate the need to test model predictions in a spatially explicit way. Good OLS or RF model predictions at short distance from inventory data largely result from the strong spatial autocorrelation displayed by both the alpha diversity and the predictive variables rather than necessarily from causal relationships. Given the difficulties to model tree alpha diversity of the African rain forests, we call for a major effort to broaden the geographical extent and intensity of field inventories.

Poster

Les ignames cultivées (*Dioscorea alata* – Dioscoreaceae) des régions occidentales malgaches: usages traditionnels, système de culture et morphologie

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Les ignames cultivées, représentées par *Dioscorea alata* et *Dioscorea esculenta*, constituaient l'alimentation de base des premiers malgaches avant le 18eme siècle et sont actuellement des ressources négligées. De plus, elles sont tombées en désuétude au profit du riz et des plantes à racine dont la culture s'avérait être plus facile. De ce fait, très peu de gens les connaissent, les cultivent et les utilisent actuellement. Or, il a été démontré scientifiquement qu'elles sont plus intéressantes, du point de vue nutritionnel et digestibilité, que les tubercules habituels. Malgré tout cela, la grande île possède une diversité considérable de ces ignames qui n'ont pas été toutes inventoriées et étudiées scientifiquement. Des enquêtes ethnobotaniques et des descriptions botaniques ont été menées pour essayer de mieux connaître ces espèces.

Les enquêtes effectuées dans les régions occidentales malgaches (région du Menabe et Parc National d'Ankarafantsika) ont permis de mettre en évidence l'existence de cinq formes de *D. alata* différenciées selon la perception des paysans: *ovibe* (igname de grande taille), *ovy fantaka* (igname enfoncée dans le sol), *ovy voay* (igname caïman), *ovy fotsy* (igname blanche) et *ovy toko* (igname groupée). La technique de culture des ignames se fait encore d'une façon traditionnelle. Cette culture se fait selon le système de végéculture (mélangées à d'autres cultures) dans les jardins de case, dans les champs de culture ou dans les jachères. Les ignames cultivées font partie des plantes vivrières et se prêtent à différentes utilisations. Elles sont consommées, en tant que collation ou substitut du riz, lors des périodes de soudure; ce sont les tubercules, les bulbilles et les feuilles qui sont consommés par les populations locales. Les feuilles sont aussi utilisées dans la pharmacopée traditionnelle, surtout dans la cicatrisation des brûlures ou diverses plaies et dans la guérison de certaines maladies. Par ailleurs, certains paysans vendent les ignames pour subvenir à leurs besoins quotidiens.

Du point de vue morphologique, des échantillons d'herbier ont été collectés pour faire la description botanique des espèces. Les cinq formes inventoriées se distinguent par la morphologie de leurs tiges, feuilles, tubercules, bulbilles et par la présence ou l'absence de fleurs.

Ainsi, le présent article apporte des éléments nouveaux pour une meilleure

connaissance de *Dioscorea alata*, une plante cultivée longtemps négligée. Cette connaissance permet d'envisager ainsi l'amélioration du mode d'exploitation et d'utilisation de cette espèce qui pourra être vulgarisée auprès de la population malgache dans le contexte de sécurité alimentaire.

Mots clés: culture, *Dioscorea alata*, morphologie, utilisations.

Oral

Recent Belgian plant hunting for new goals

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Present-day botanical expeditions obviously differ completely from historical expeditions. We have other goals, logistics might be many times easier, yet administration and regulations probably are much more complicated. We regularly travel in several Latin American countries in the framework of our research on Neotropical *Peperomia* (Piperaceae) and *Hydrangea* (Hydrangeaceae). Despite the more than 200 years that separate us from the three expeditions sponsored by the Spanish king Carlos III de Borbón, lead by respectively Hipólito Ruiz and José Antonio Pavón (Peru and Chile, 1777-1788), José Celestino Mutis (Colombia, 1783-1808), and Martín Sessé and José Mariano Mociño (Mexico, 1787-1803), their results are still useful today. The collections, publications, notebooks and diaries of these intrepid plant hunters offer a wealth of interesting information and yet, at the same time, confront us with the dramatic loss in both bio- and cultural diversity since then. Similar to our predecessors, we explore extensive areas for new species, or new localities of already described species, collect and describe plants, and provide detailed documentation of their habitat and use. In contrast with these historical botanists, we constantly face local examples of the global threats to biodiversity and environment, such as human pressure, overexploitation and climate change, even on the most remote localities.
Our herbarium collections are deposited in several herbaria in the country of origin, other herbaria interested in these groups and in Belgium. Living collections are placed in the Ghent University Botanical Garden, where we have built the largest *ex situ* collection of *Peperomia* in the world (with approximately 2000 specimens of 700 species), as well as a very representative collection of the family Hydrangeaceae (with approximately 300 accessions). These scientific collections serve as a centre for the conservation of diversity of these plants, some of which also have medicinal uses. They are extensively used for a wide range of studies such as systematics, taxonomy, contributions to Floras, checklists, phylogenies, biogeography, character and growth form evolution, anatomy, biomechanics, speciation processes, genetic diversity, etc. All these data help us to understand plant biodiversity and deliver information that can be used to support conservation actions. Planned activities also include involvement in global Red Lists, reintroduction projects and partnerships with botanical gardens and communities in developing countries. In 2010, landmark year for biodiversity, we are obliged to think beyond descriptive science and publication pressure, in order to save plants for the future.

Poster

Botanical diversity and conservation of Javakheti plateau (Lesser Caucasus)

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The Javakheti plateau, on the territory of Georgia, is characterized by a hilly, plain topography and is located at 1500-2100 m asl. Mean annual temperature is 2-6°C, and annual amplitude of temperature is 24-25°C. The annual precipitation is 650-700 mm. The climate is less continental and more humid in contrast to adjacent areas of Armenia and Turkey. Some landscapes resemble the steppes of Kuban, southern Russian Federation. Noteworthy mountains in the area are Mts. Didi Abuli (3300 m asl) and Emlikli (3053 m asl); flora of these mountains is different from that of the plateau.

Botanical diversity of the Javakheti plateau was studied using conventional field itinerary and botanical-geographic methods.

Diversity of the vascular plants of the Javakheti historical-geographic region is represented by ca. 1500 species. Phytolandscapes are made up of the following vegetation types: 1. steppes (grass-forb steppe as well as *Botriochloa, Stipa, Festuca* and *Carex* steppes); 2. meadow-steppes; 3. subalpine and alpine meadows; 4. fragments of alpine carpets and subnival petrophytes; 5. wetland plant communities with many boreal species settled on this area during the glaciation of the Quaternary period; 6. birch-pine and birch-Caucasian rhododendron forest derivatives.

Wetland plant communities are widespread (there are ca. 60 large and small lakes on the plateau) with Eurasian, West Asian-Caucasian and European-Mediterranean species such as *Carex wiluica* (considered as a relict species), *C. inflata, C. distachia, C. oreophylla, C. medwedewii, C. tristis, C. acutiformis, C. acuta, Calamagrostis canescens, C. neglecta, Sagittaria sagittifolia, Menianthes trifoliata, Utricularia vulgaris* etc. Presence of elements of the boreal flora is noteworthy as they presumably penetrated into this area during the Quaternary glaciation through Minor Asia and Middle Asia. Xerophilous floristic elements, many of which are characterized by disjunctive distribution, were also important in the process of formation of the Javakheti high mountain flora. The influence of the flora of the Greater Caucasus Main Range was significant: there are many shared and vicarian species.

The alpine zone on the Lesser Caucasus similarly to the eastern Greater Caucasus

(Pirikiti Khevsureti, Tusheti, Dagestan) is raised by ca. 200 m. Up to the lower limit of the subnival zone closed communities are mainly formed by *Festuca woronowii* with a mixture of *Aetheopoppus pulcherrimus, Heracleum transcaucasicum, Aster alpinus, Senecio taraxacifolius, Campanula stevenii, Tragopogon filifolius, Hedysarum armenum.*

Flora of Mts. Abuli and Emlikli is noteworthy. On the Javakheti plateu the subnival zone is represented only on these mountains, at 3000-3300 m asl. Despite a narrow hypsometric range, the number of typical subnival species exceeds 60 with 20-25% of Caucasus and South Caucasus endemics (*Cerastium pseudo-kasbek, Minuartia circassica, Erysimum krinitzkii, E.gelidum, Astragalus vavilovii, Eunomia rotundifolia*); the other species are West Asian-Caucasian, Mediterranean and Palearctic (*Hedysarum armenum, Pedicularis armena, Myosotis alpestris, Chamaesciadum acaule, Corydalis alpestris, Gentiana angulosa)*

Flora and vegetation of the Tetrobi calcareous massif located north-west of the Javakheti plateau is very interesting. Locally distributed endemics such as *Scorzonera dzawakhetica, S. ketzkhovelii, Gladiolus dzavakheticus, Muscari sosnowskyi*, etc. occur there. The species are present in *ex situ* conservation collections of Tbilisi Botanical Garden and Institute of Botany and Bakuriani Botanical Garden. Establishment of the Javakheti protected area is in progress for *in situ* conservation of rare and endemic species.

Poster

Phylogeny of two *Angraecum* Sections (*Dolabrifolia* and *Pectinaria)* with a focus on the Continental Africa

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This study is part of the Ph.D. project of the first author which aims to elucidate the taxonomy and the phylogenic position of two Sections of the genus *Angraecum*: Sect. *Dolabrifolia* Pfitz and Sect. *Pectinaria* Benth. The former is characterized by very short, laterally compressed and densely imbricate leaves and has his center of endemism and diversity in Atlantic Central Africa (ACA). Four species are currently described in the Section *Dolabrifolia*. However, recent fieldworks in ACA allowed the discovery of two additional taxa. The other section is characterized by alternate and elongate or linear leaves with a distinct blade, never compressed laterally, never equitant, more or less laxly distichous. Four species from West Central Africa were described first, followed by five species from Madagascar and La Réunion. Here, we will focus only on the Continental African taxa.
Main objectives of the present study are (1) to test the monophyly of the two studied sections as presently delimited by assessing the phylogenetic relationships of the taxa, using DNA sequences data from five chloroplast markers (*matK*, *rps16*, *trnC-petN*, *trnL-F* and *ycf1*) and two nuclear markers (*Agt1* and *ITS*), and (2) to provide a comprehensive revision of the two sections and test whether *Angraecum* section *Dolabrifolia* may be worthy of recognition at the generic rank, as hypothesized by Szlachetko & Romowicz (2007). The preliminary results of the phylogenetic analyses are presented and discussed here.

Key words: *Angraecum*, Atlantic Central Africa, *Dolabrifolia*, *Pectinaria*, phylogeny, chloroplastic and nuclear markers.

Oral

How far local use of target plant species challenge their conservation in land use area in Africa?

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Most of the developing countries particularly those in Africa are experiencing a rapid changing environment which makes it critical to ensure respect for traditional ways of life and culture, as well as conservation and sustainable use of biodiversity. Several studies showed (i) the importance of Non Timber Forest Products (NTFP) to household income, (ii) factors affecting the uses values of NTFPs (iii) the relevance of indigenous knowledge for the genetic diversity assessment of NTFPs and the implication for species conservation and improvement, (iv) the local community perception of the NTFPs biodiversity conservation (v) the impact of the use of NTFPs on their conservation. In general, NTFPs are used for nutritional, medicinal, cultural, and economic purposes. Indigenous knowledge on NTFPs trees varies according to ethnic groups, sex, age and education level. Within the NTFPs species, there is evidence indicating the existence of a number of local types differing in habit, vigour, size, quality of the fruits, leaves and seeds (e.g. *Adansonia digitata, Tamarindus indica*). Studies also showed that, only a morphotype-based approach used by local knowledge did not detect strong genetic effects that underlie the traditional intra species classification of certain species. Then, conservation strategies involving local knowledge should be developed with caution and should always combine scientific knowledge. It is also found that farmers used to conserve focal tree species with preferred combination of traits in their agroforestry parkland. So far as most of the target species are under threatening processes in land use area, protected areas remaine a sound tool for long term conservation of plant resources.

Key words: NTFPs, gender, indigenous knowledge, uses, improvement, conservation

Oral

If conservation is a responsibility for all, why are taxonomists going extinct? Or are they? Perspectives from South Africa

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South Africa is fortunate in that it is relatively large, has a rich and diverse natural resource base, and unsurpassed scenic beauty. The coastline is approximately 3 000 km long, from the Mozambique border in the east to the mouth of the Gariep River in the west, and the general topography comprises a coastal belt bordered by a more or less continuous range of mountains on the edge of a vast interior plateau with an average elevation of 1,200 m. The location, ocean currents and topography account for the fact that South Africa probably is climatologically least typical of all African countries. As a result of these factors, among others, southern Africa is characterised by a variety of major climatic, topographical, geological and pedological transition zones which create a wide variety of habitats for plant colonisation. As a result of, among others, these factors, the subcontinent hosts a flora that is very high in terms of species/area ratios, even when the Cape Floral Kingdom, which is known to be extremely rich in species and endemic taxa, is excluded. This exceptional southern African floral wealth has been known internationally since the early seventeenth century.

Of course, the unsurpassed temperate biological richness of South Africa necessarily demands significant responsibility for its conservation. For some time there has been consensus that efforts to conserve the floral heritage of the world, and by implication that of South Africa, must be seen as priorities. However, globally the general conservation status of the flora and natural vegetation is still deficient in a number of respects. The same applies at a fine scale where the conservation of specific threatened plant species also gives cause for concern. The lists of published threatened plant species are essentially first drafts and much more research is required before the conservation of threatened species, and landscapes, can be put into practice on a scientific basis. In this regard, the role of taxonomists with natural history skills will be absolutely crucial. Why then, one must ask, are there not more taxonomists employed today?

Oral

Thirteen years of experience with the Central Africa orchid shadehouse network: main results and perspectives

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In Central Africa, 70% of the epiphyte flora is composed of orchids, and ca. 90% of epiphytic orchids encountered in the field are sterile and therefore nearly impossible to identify. Moreover, most historical specimens are poorly conserved, obscuring key features, making identification difficult, and precluding the description of new species. To overcome these obstacles, a shadehouse cultivation system, initially launched in São Tomé in 1997, has been successfully developed in Central Africa (Gabon, Cameroon, Equatorial Guinea, R.D.Congo and São Tomé) to obtain fertile, identifiable material of orchid taxa. After 13 years of experience, we provide here a first summary of the state of the art.

Until now, 13,000 living orchids collected in the field are put into cultivation in the shadehouse's network situated in Central Africa where they are nurtured until they flower. Each living specimen is digitalized in a relational database that allows a complete traceability from the sampling locality of living specimens to produce classical outputs like herbarium specimens or more elaborate: roots for mycorrhizes' studies or experiments for studying the reproductive biology.

The Central Africa shadehouse network has produced more than 7,000 orchid herbarium specimens to date, enabling taxonomic revisions of difficult genera as well as the discovery of more than 40 new taxa. This method is particularly successful for conducting thorough inventories of targeted areas since most living epiphytes found in the field can be brought into cultivation. Our method also provided data used to conduct the first biogeographical study of orchids from West

Central Africa. Moreover, the living plants grown in shadehouses can yield fertile material year after year, enabling specimens to be sent to numerous herbaria. In the same way, high quality orchid pictures are taken in the shadehouse and are widely disseminated through our web site at www.orchid-africa.net/. Finally, the cultivation of rare and endangered orchid species contributes to their *ex situ* conservation; the shadehouse can also serve as a living museum where orchid species can be shown to the public and to tourists.
In conclusion, the shadehouse system has proved to be an efficient and cost effective sampling procedure for yielding high quality liquid specimens, photos, and leaf tissue for phylogenetic analyses of epiphytes. New applications will be to: 1) study the orchid-fungi symbiosis, 2) improve our knowledge of the reproductive biology, 3) provide on demand silicagel or fresh material for phylogenic studies or chromosome count.

Key words: Central Africa, Orchidaceae, taxonomy, biogeography, *ex situ* conservation, living specimen, herbarium specimen.

Poster

Botanical collectors in Central Africa

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The herbarium of the National Botanic Garden of Belgium is specialized on the flora of Central Africa (the Democratic Republic of Congo, Rwanda and Burundi). During more than 100 years information on this flora is compiled. It concerns herbarium specimens, field books, itineraries, archives and a variety of card indexes on collectors, collecting places, vernacular names, scientific names etc.

In our database of Central African collectors we compiled information from different sources: the herbarium specimens, an unpublished manuscript prepared by De Wildeman, card indexes on collectors, itineraries, field books, biographies, etc. The bulk of the information is kept in the National Botanic Garden of Belgium and is completed with information found in online databases (e.g. Aluka), databases of other herbaria (BM, WAG, L, U, WAG etc.) and with information provided by individual collectors.

At the moment the database contains information on more than 1200 collectors who were collecting plant specimens in the Democratic Republic of Congo, Rwanda and Burundi. It provides information on the collections and the collectors, such as literature references, biographical information, specimen lists and itineraries. Also the herbarium specimens are kept here.

Additional information on Central African collectors and collections is always welcome.

Poster

Towards a monograph of the genus *Thysananthus* (Marchantiophyta: Lejeuneaceae): progress and challenges

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A revision of about 82 described species and infraspecific taxa of the liverwort genus *Thysananthus* Lindenb. (Marchantiophyta: Lejeuneaceae) based on detailed morphological and anatomical analysis of type specimens and additional materials leads to the recognition of 11 species, including the new species *T. discretus* Sukkharak & Gradst. The members of this genus are epiphytes and occur in lowland forests and montane cloud forests throughout the tropics. The centre of diversity is in Southeast Asia, with five species occurring there. Three species are found in Western Melanesia (New Guinea, Solomon Islands), one occurs only in Papua New Guinea and one is known from the New World tropics. New or little known morphological characters include the appendages of leaves, female bracts and perianths and the adnation of underleaves to leaves on the left side along the right-hand branches and on the right side along the left-hand branches. Preliminary molecular-phylogenetic results, missing data and problems encountered will also be discussed.

Oral

Wild edible plant knowledge by the Turumbu, Mbole and Bali ethnic groups, District Tshopo, Oriental Province, D.R.Congo

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Introduction: Documenting and revalorizing the rapidly disappearing indigenous knowledge on wild edible plants (WEP) is essential to promote health and preserve diversity. Until now, only a few fragmented studies have been conducted on WEPs in and around Kisangani (capital of the Oriental Province with a population of mixed ethnic origins). No specific ethnobotanical data could be found for most of Tshopo District's indigenous populations.
Objectives:
1) Document and compare Turumbu, Mbole and Bali WEP knowledge.
2) Identify local species preferences for further study and domestication.
Methods: To document maximum diversity in plant species and utilisations, we selected 3 tribes in 3 different territories of Tshopo District.
Focus group discussions were organized in 3 villages per ethnic group. Village inhabitants were asked to cite all edible plants they know and use without cultivating them ('free listing'). Per plant, plant parts used, preparation methods, availability, other-than-food uses and commercial potential were discussed. Participatory ranking exercises were organized in separated gender groups to evidence local preferences in wild fruits and vegetables.
Results: We documented in total 166 WEPs (165 species and 2 varieties) in 71 families. The Turumbu know and use 85 WEPs, the Bali 86 and the Mbole 99. Jaccard similarity indices between 2 villages of the same ethnic group were significantly higher than those between 2 villages of different ethnic groups. The 166 WEPs have 198 different plant parts that are used for 228 different specific food uses. *Tetracarpidium conophorum* and *Landolphia owariensis* are sold in all villages, *Piper guineense* in 8 of the 9 villages and *Megaphrynium macrostachyum*, *Cola acuminata*, *Dioscorea praehensilis* and *Anonidium mannii* in 7 of the 9. Over all villages, we recorded 57 use reports for *Aframomum laurentii*, 47 for *Canarium schweinfurhtii*, 46 for *Laccosperma secundiflorum*, *Costus lucanosianus* and *Piper guineense*, 44 for *Megaphrynium macrostachyum* and 42 for *Landolphia owariensis* and *Anonidium mannii*.
Conclusion: WEP knowledge is still very active in Tshopo District and closely related to cultural identity ('biocultural heritage').

Inventories and preference rankings should be complemented by nutritional analyses and market studies to set priorities for further study and participatory domestication.

Key words: Tshopo, Wild Edible Plants, Ethnobotany.

Oral

Nature as an ingenious engineer and designer and the necessitate importance to save the biodiversity on earth

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How is a water spider able to swim and dive without getting wet? This is one of the questions which the modern discipline of bionics tries to answer. The aim of bionic studies is to translate nature's solutions into human technology, for there is no doubt that nature is the best engineer and most ingenious designer of all.
The comparatively recent research area of bionics is actually an inter-disciplinary subject which combines biology, engineering science, architecture and mathematics. The basic principle is to make nature's ideas and problem solutions, which have stood the test of time over millions of years of evolution, usable for man.
The world's first student of bionics was the Italian Leonardo da Vinci. No less than 500 years ago, this ingenious all-rounder studied the flight of birds and designed a flying machine according to his findings. He also derived the principle of the helicopter from what he observed in nature. Later it was the turn of Otto Lilienthal to triumph with his "flyingapparatus",whichhehaddesignedaftercarefulstudyofthestork'swingstructure. Airbus engineers from Delft University have created the smoothest surface of an aeroplane on natures phenomena, the GLARE concept. Still other Airbus engineers based on the rough skin of the shark the development of a striated foil coating for the wings of aircraft. The result is up to six percent less friction and considerable savings in aviation fuel.
Self-cleaning surfaces are based on the example of lotus leaves, of our German colleague Botanist Prof. Wilhelm Barthlott and his team (Bonn University), or the highly resistant metallic foams are derived from the bone structure and the latest, self-sharpening cutting tools copy the principle of rodent teeth. Nature even provides ingenious solutions for day-to-day things such as the Velcro fastener. Nature is also a model of sustainability. Bionics research does not mean copying nature. The aim is rather to understand its principles and use them as a stimulus for innovations, like the innovation at Delft University of Technology on the fine dust reduction or the liquid gas dissolvent catcher. A more direct use of natures phenomenon is the development of a biological UV filter, which will be installed in fifteen different branches of industry, for example to increase the power of a Solar Cell and to remain a satellite for ever lasting instead of twenty years of use right now.
We can also think about physics and biology. A good example is the electro-

evaporation of plants in the use of hydrodynamic atomizing of secondary metabolites for medicinal purposes, like the electro-milking technology of yew trees to create taxol (anti cancer treatment). The inventions of nature, which have been developed and continuously improved over millions of years, provide an inexhaustible reservoir of ideas and inspirations from which not only technology can benefit. More than ever before, bionics can also further the cause of environmental protection. Many of the innovative concepts which engineers and scientists are adopting from nature correspond to the principle of sustainability. Nature always achieves its objectives economically, with the minimum energy, conserves its resources and completely recycles its waste an example which is well worth following. But most of all, without the enormous variation in biodiversity it will be simply impossible to understand the wide scope of natures offer. We need to understand the still unknown aspects of nature by careful wild species observations. The newest concept of self healing systems, for example the use of lignified fibres of *Periploca greaca* for self healing concrete, was impossible to continue if we haven't this particulate species anymore. Plants play a crucial role in our human world, our sustainable environment, simply because we couldn't thrive or survive without them! One example… Do you eat potatoes? If so, do you realize that we eat each 8 till 10 years a novel race? Simply because grown potatoes in crops are infected by nematodes ands make them weak and unproductive. In order to keep the genetic defence effective, we need strong original genes of original wild species, otherwise we end up in a butter potato stuffed with 60% or more nematodes! So, be extremely selfish and save biodiversity as a necessity for food, innovations, turning into technology and eventually to safe mankind!

Poster

Leaf nutritional value of baobab and tamarind

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Baobab (*Adansonia digitata* L.) and tamarind (*Tamarindus indica* L.) are multipurpose fruit trees with high potential in arid and semi-arid areas of West-Africa. Both tree species are primarily used for their fruits, but virtually every component (fruit pulp, seeds, flowers, leaves, wood, bark) has its specific applications, ranging from human and animal consumption to traditional medicine, fuel wood or rope-making, trading and processing. For example, baobab its fruit pulp contains high amount of vitamin C and is used as sauce or drunk by dissolving the pulp in water or milk. Young leaves are cooked as spinach, sauce or soups. Seeds are eaten fresh or roasted, used as fermenting agent or cooking oil. Bark fibers are mainly used for rope-making. Tamarind its fruit pulp is the richest know natural source of tartaric acid and is prepared in juices, sauces and chutneys. Leaves are eaten as vegetable or used to make curries and soups. Seed kernel powder is an important product for paper making. Wood can serve as fuel. It is thus not surprising that West African farmers identified baobab and tamarind as priority species for domestication. Despite their high potential and use at local scale, both species are not (often) actively planted and only little formal research has been carried out to assess their nutritional value.

In Mali, our study site, baobab and tamarind food products can play an essential role in combating poverty, food insecurity, vitamin and micronutrient deficiencies. In a first study we will focus on the pro vitamin A content of leaves, as vitamin A deficiency in Mali is clinical. Therefore, young potted Malian baobab and tamarind trees from different localities were grown in a greenhouse (University of Antwerp) and samples of young leaves were collected. The effect of cooking and processing on pro vitamin A leaf content will be determined by preparing traditional soups. Results are being further investigated. Information about leaf nutritional value should be combined with other nutritional and chemical characteristics, morphology, phenology, productivity and ideally genetics to allow for a well-considered farmer aided selection of plus trees for future active plantings.

Poster

Congo River expeditions 2009-2010: collection, investigation and conservation of lichens and lichenicolous fungi

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The University of Kisangani, the Royal Museum for Central Africa, the Royal Belgian Institute for Natural Sciences and the National Botanic Garden of Belgium have established a multidisciplinary project to study the natural diversity in Democratic Republic of Congo. During a preparatory expedition in 2009 and the expedition in 2010, lichens and lichenicolous fungi were collected at c. 35 different sites. The lichen flora of Central Africa is mostly unknown. Only 183 lichens are known from D.R.Congo so far. This is less than 20% of the species expected to occur in this country. The lichen flora is even less known for most of the surrounded countries.

The investigation is aimed 1) to contribute to the taxonomy, the ecology and the distribution of lichens in Central Africa 2) to contribute to the study and the protection of the natural diversity in the Congolese rain forests and 3) to create a reference collection allowing the study of the Central African diversity by modern techniques (e.g. DNA).

During the expeditions 2009-2010, about 1500 specimens of lichens were collected on the bark and the leaves of trees in different habitats: villages, plantations, primary and secondary forest mainly located along the river. DNA-samples of 220 specimens were made for molecular analyses. In addition, about 30 cultures of the mycobiont have been obtained. Preliminary analyses of the specimens show that the species mainly belong to the families Arthoniaceae, Coenogoniaceae, Ectolechiaceae, Graphidaceae, Porinaceae, Roccellaceae, Strigulaceae, Thelotremataceae and Trypetheliaceae.

Poster

The fishy milkcaps (*Lactarius volemus*, Russulaceae) of northern Thailand and northeast India: hidden diversity revealed by multiple gene phylogeny

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Lactarius volemus (Fr.: Fr.) Fr. is a well-known and morphologically easily recognizable milkcap of the Northern hemisphere, forming ectomycorrhiza with both deciduous and coniferous trees. It was originally described from Europe, but is also reported in Asia and North America. Although it is characterized by several macro- and micromorphological features, substantial variation in colour, lamellae spacing and changing and staining of the latex has been recorded and it is therefore considered as a putatively unresolved species complex. Current taxonomy does not reflect the hidden diversity of this group, making a thorough systematic study inevitable. This study aimed at identifying the number of species present in tropical northern Thailand and northeast India (Sikkim). Combined LSU, ITS and *rpb2* nuclear gene phylogenies revealed a remarkably high species-richness. No less than six terminal branches and twelve monophyletic clades represent eighteen Thai phylogenetic species. Six out of twelve monophyletic clades could be distinguished based on morphology and are described as the following new species: *L. acicularis*, *L. crocatus*, *L. distantifolius*, *L. pinguis*, *L. porphyreus* and *L. vitellinus*. Although five of the remaining monophyletic clades show some morphological differences, these are too subtle and do not allow for a clear-cut species delimitation without the corroboration of molecular data. The *L. volemus* group of northern Thailand is therefore still considered as partially cryptic. One terminal branch and four strongly supported monophyletic clades represent five Indian phylogenetic species. All four clades could be easily recognized based on morphology and will be described as new species. Pleurolamprocystidia length and broadness, pileipellis hair length, cap colour and lamellae spacing are important diagnostic characteristics. Spore morphology, latex discolouration and cap surface texture are less useful as diagnostic feat

Oral

State-funded journeys of exploration and botanical knowledge in the Age of Versailles

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This paper investigates state-funded botanical knowledge gathering in the so-called "Age of Versailles", a period in which French scientific exploration of the world outside Europe changed drastically. During the reign of the Sun King, and under Colbert's impetus, intelligent travelers to overseas destinations or residents in colonial outposts received instructions for observation and data collection, in order to gather plant knowledge that would be useful to the state. Small-scale projects prevailed. With the backing of royal institutions such as the *Académie Royale des Sciences* and the *Jardin du Roi*, individuals such as Charles Plumier, Joseph Pitton de Tournefort and Louis Éconches Feuillée brought back specimens and descriptions of "plantes utiles". Under Louis XV the expeditions increased in scale. Competition with England pushed the French to the Pacific, fusing science and exploration with geopolitics. Vast teams of researchers travelled on board of military vessels, equipped with improved observation instruments and more detailed instruction texts, bringing back vast amounts of specimens that enriched collections in Paris. Under Louis XVI this process of amplification culminated in La Pérouse's expedition that ended dramatically on the reef of Vanikoro.

Poster

The cultivation of *Pleurotus* and *Lentinus* mushrooms in tropical and subtropical areas: an overview

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The cultivation of edible mushrooms dates back a long time (Chang & Quimio 1982). The oyster mushrooms [*Pleurotus* (Fr.) P. Kumm.] are among the most popular edible mushrooms, and their cultivation is practiced throughout the world (Kong 2004). *P. ostreatus* (Jacq.) P. Kumm.is the most widely-cultivated *Pleurotus* species for which many commercial strains have been developed. Other *Pleurotus* spp., i.e. *P. cystidiosus* O.K. Mill., *P. djamor* (Rumph. ex Fr.) Boedijn and *P. pulmomarius* (Fr.) Quél., are also exploited in both tropical and subtropical regions. In addition, *Lentinus tuber-regium* (Fr.) Fr., a common mushroom species in the southern part of Nigeria, is being studied and cultivated for the production of edible basidiomata and sclerotia (Oso 1977); sclerotia are used for the preparation of health-promoting compounds according to traditional medical practices. Oil palm fruit fiber spawn often substitutes the sclerotium in propagating this fungus (Okhuoya & Okogbo 1991). *L. squarrosulus* Mont. is also a prized edible mushroom in the tropics, which is usually cultivated on tree sawdust (Ayodele et al. 2007). A diversity of production methods utilizing logs, shelves, boxes, bags and bottles have been developed for the cultivation of *Pleurotus* and *Lentinus* mushrooms on various locally abundant agro-forestry wastes such as sawdust, straw and cotton residues. Shelf and box cultivation methods are mainly applied for the cultivation of *P. ostreatus*, *P. pulmonarius* and *P. djamor*, while bags and bottles are used for *P. cystidiosus*. Selection of the cultivation methods is based on the mushroom species variety, availability of pertinent technological know-how and suitable infrastructure, and farmer's preferences.

Oral

Using relative floristic resemblance to evaluate the value and placement of protected areas

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When it comes to establishing National Parks or other protected areas, it is important to shelter as many as different biomes and species within the border of these areas as possible. Several methods exist to evaluate which areas should be selected to optimize the total number of included species, but most of these methods are based on total knowledge of the species present in all areas. For most tropical areas our knowledge of occurring species is very limited, hindering the application of such methods. Under these circumstances a 'floristic comparison' using a relative similarity instead of an absolute one can help to estimate similarity between areas and to decide which areas would contribute most to optimize species conservation. The method can be used as well to evaluate the geographical extent of the species occuring in a given area, and hence the extent of the conservation effort. The possibilities of and obstacles for this method will be demonstrated by analyses of the species assemblages of several National Parks in Gabon.

Poster

Biodiversity dynamic and land use conversion in the semi-deciduous rain forest in Southern Cameroon

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The main objective of this work is to appreciate the impact of slash-and-burn agricultural practice on plant biodiversity. Twenty-four transects of about 1.5 km long and 10 m wide, established in eight villages were used to evaluate the cover percentage of each land use system (LUS). Three hundred and twenty plots of 625 m^2 (25 x 25 m) each were surveyed in these villages. In these plots, all the individuals with DBH greater or equal to 4 cm were recorded. Seven LUS were identified in Yaounde region: 23 % of these were cultivated land, 36 % were fallows, 16 % were cocoa field and 5 % represent the secondary forest derrived from the slash and burn practices. In the regions of Mbalmayo and Ebolowa, eight LUS were identified, of which six shared with the region of Yaounde and two different, the degraded forest and swampy forest. Principal Component Analysis showed that in each LUS, diversity and species richness vary according to the region, the land history and the surrounding vegetation. When a farm is put into fallow, *Chromolaena odorata* rules the young fallow where it is almost monospecific. At about 6 to 7 years of age, woody pioneers species that could cover *C. odorata*, develop orioles from which this species can be progressively eliminated. In the Yaounde region, these species are mainly *Alchornea cordifolia* and two species of the genus *Albizia* (*A. zygia*, *A. adiantifolia*). In the Mbalmayo region, *Albizia adiantifolia* is the dominant species in the middle fallows while *Anthocleistha schwenfurthii* is the dominant woody pioneer species in the Ebolowa region. In the mid-aged fallows, many woody and herbaceous lianas grow on these trees providing shade under which *Chromolaena odorata* cannot live. This condition may promote growth of *Macaranga* spp., *Margaritaria discoidea* and *Musanga cecropioides*, which characterise old fallows. If the old fallow is not converted into cropland, it will evolve progressively into a young secondary forest (20-25 years). In a 30 years old secondary forest, pioneers species are represented either by standing dead individuals or few trees.

Index to authors

This list includes participants that sent a registration form and that confirmed their participation by submitting an abstract.

Albuquerque, S. 18
Beau, N. 90
Benini, C. 19
Bigendako, M.J. 21, 22, 75
Bigirimana, J. 22
Biloso Moyene, A. 23
Bizuru, E. 24
Boyemba, F. 25
Bussmann, R.W. 26
Buyck, B. 27
Bytebier, B. 28
Cocquyt, C. 30, 32, 36
Contu, S. 33
Crous, P.W. 34
Dauby, G. 35, 51, 79
de Haan, M. 32, 36
Degreef, J. 37
De Kesel, A. 37
De Smet, Y. 38, 82
Dessein, S. 54, 55, 88
Dhetchuvi, J.-B. 40
Diagre, D. 41
Droissart, V. 42, 85, 88
Duminil, J. 43, 45, 51
El-Barasi, Y.M. 46
Everaert, J. 47
Ewédjè, E.B.K. 48, 51
Fabri, R. 49
Geelen, D. 61
Geerinck, D. 42, 63
Goetghebeur, P. 38, 50, 52, 62, 82
Granados-Mendoza, C. 50, 82
Hardy, O.J. 35, 43, 45, 48, 51, 79, 85
Huygh, W. 52, 62
Ingelbrecht, I. 53
Janßen, T. 54, 55
Kahindo Muhongya, J.-M. 56, 57
Kani Kani, M. 58
Kury, L. 60
Larridon, I. 52, 62
Lejoly, J. 22, 25, 56, 57, 63, 64, 75
Lowry II, P.P. 65
Meerts, P. 66
Mouamfon, M. 67
Moupela, C. 68
Mpawenayo, B. 70
Muasya, M. 62, 71
Mutambwe, S. 72
Ndayishimiye, J. 75
Ndjele, L. 63, 64
Njouonkou, A.L. 67, 77
Nuytinck, J. 98
O'Farrell, I. 78
Parmentier, I. 22, 51, 79
Razafinimpiasa, L. 80
Robbrecht, E. 54, 90
Samain, M.-S. 38, 50, 82
Shetekauri, S. 83
Simo, M. 42, 85, 88
Sinsin, B. 86
Smith, G.F. 87
Stévart, T. 29, 35, 42, 85, 88
Stoffelen, P. 75, 90
Sukkharak, P. 91
Termote, C. 92
Ursem, B. 94
Van den Bilcke, N. 96
Van den Broeck, D. 97
Van de Putte, K. 98
Van Onacker, J. 49
Verbeken, A. 98
Vandersmissen, J. 99
Venturella, G. 100
Wieringa, J. 101
Zapfack, L. 67, 102

National Botanic Garden of Belgium

The National Botanic Garden of Belgium is one of the larger botanic gardens in the world. Its cradle stood in the centre of Brussels. This 18th century garden was moved to make way for an industrial exhibition in 1830. In order to save the valuable plant collections, the Royal Society for Horticulture and Arboriculture of the Netherlands was founded. The Society laid out a new botanic garden in the rural countryside where nowadays the busy Brussels North Railway Station is located.

The principal activities of this garden were economic due to the development of associations with the Dutch colonies. After Belgian independence the attention shifted to the botany of Central Africa and horticulture. In this period the head gardener Bressiers 'invented' Belgian endives (witloof) in the cellars of the garden. Due to the encroaching city the Garden moved again.

In 1938, the Belgian state bought the Bouchout Domain (Meise) from the royal family, previously inhabited by King Leopold II's sister Charlotte, the Empress of Mexico.

The Bouchout Domain has a total area of 92 hectares. The living plant collections contribute to the botanical and horticultural research as well as to the education and conservation activities of the Garden. The greenhouse and outdoor collections together hold nearly 25,300 accessions of living plants (about 17,400 taxa and 3,170 genera) which is about 6% of all known plant species of the world. Half of them can be seen in our greenhouses (Plant Palace), the other half, comprising cultivated and indigenous plants, grows outdoors.

The Plant Palace, 13 interconnecting glasshouses, simulates the climates of different regions of the world e.g. rainforest, desert, Mediterranean.... Two of the glasshouses have a thematic approach: the Evolution House and Mabundu, which houses tropical useful plants like crops and spices.

The Outdoor Collections accommodate about 7,630 taxa from all temperate regions of the world. A major part of them is planted in thematic collections open to the general public. Three systematic collections form the core of these plantings: the Herbetum (herbaceous plants arranged to the systems of Cronquist & Takhtajan), the Fruticetum (woody plants arranged to the system of Dahlgren) and the Coniferetum (gymnosperms arranged by genus). Nearly all hardy or 'half-hardy' genera are represented in these collections.

Another collection type is shown by the genera collections which give a thorough overview of the representatives of species and cultivars in the genera *Quercus*, *Rhododendron*, *Hydrangea*, *Acer* (Japanese & Chinese), *Magnolia*. Other developed thematic collections are the medicinal plants garden, the North American forest theme, the Mediterranean plants collection. A lot of collection plants are displayed in shrubberies and mixed borders all over the park. Rare or unusual tree species and cultivars are dispersed over the lawns and play an important role in the landscape dominated by indigenous tree plantations.

Royal Academy for Overseas Sciences

Historical overview

In 1959 the Academy received its name and current functions, since which date it has continuously adjusted its sphere of activities to the changes – and at times the upheavals – undergone by countries overseas.

For several decades the activities of the Academy concentrated essentially on Africa, to which it has remained traditionally attached. Nevertheless, over recent years it has diversified its focus of attention and the Academy has gained a more international character by forging bonds with a wide range of scientific organisations, as witnessed by the co-operation agreements signed with UNESCO, the "Koninklijk Instituut voor de Tropen" (The Royal Institute for the Tropics – The Netherlands), the "Instituto de Higiene e Medicina Tropical" (the Institute for Tropical Hygiene and Medicine) and the "Instituto de Investigação Científica Tropical" (The Institute for Tropical Scientific Investigation) (Portugal), the "Third World Academy of Sciences" (Italy), the "Chinese Academy of Sciences" (China) and the "Academia Nacional de Ciencias" (The National Academy of Sciences – Bolivia).

The Academy also takes an interest in knowledge about the past and prides itself on its role in maintaining the memory of the past in the light of the present, including the colonial period during which it was founded.

In fact, it was under the name of "Institut Royal Colonial Belge" (Royal Belgian Colonial Institute) that the present Academy was founded in 1928 and inaugurated in 1929 by the Minister, Henri Jaspar. At that time the area over which it carried out its mandate was restricted exclusively to the Belgian Congo. In 1931 the Institute gained greater liberty of action, thanks to its civil status which subsumes an autonomous existence, the ownership of a patrimonium and the possibility to receive gifts and legacies.

Renamed as the "Royal Academy of Colonial Sciences" in 1954, our Institution changed its name to the present "Royal Academy of Overseas Sciences" in 1959.

Aims and objectives

As a tool dedicated to overseas countries the Academy contributes to the progress of scientific knowledge about overseas regions. It acts as a meeting place for communication between North and South and represents an independent reference. It also promotes research and the dissemination of knowledge concerning overseas countries, both inside these countries and within Belgium.

Scripta Botanica Belgica **48**

The present issue provides the programme and the abstracts for the oral and poster presentations of the International Symposium Botanical diversity: exploration, understanding and use. This conference was organised by the Royal Academy for Overseas Sciences and the National Botanic Garden of Belgium. The meeting took place at the Bouchout Castle in Meise from September 16th to 18th 2010.

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